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September 23, 2014

BY ELECTRONIC MAIL

Purvi P. Patel, EIT
Massachusetts Environmental Policy Act (MEPA) Office
Executive Office of Energy and Environmental Affairs
100 Cambridge Street, Suite 900
Boston, MA 02114

Re: Project Name: Baxter Road and Sconset Bluff Stabilization Project
EEA No. 15240
(Town of Nantucket)

Dear Ms. Patel:

As previously advised, this firm serves as Town Counsel to the Town of Nantucket (the "Town"). We submit the following comments on the above-captioned project on behalf of the Town and on behalf of the Nantucket Conservation Commission (the "Commission").

The Town and the Commission respectfully request that the Secretary issue a Certificate requiring that the project proponent, Siasconset Beach Preservation Fund ("SBPF") provide an Environmental Impact Report and that the scope of such report include an evaluation of those aspects of the project "that are likely, directly or indirectly, to cause Damage to the Environment." See 301 CMR 11.06(9). This should include evaluation not only of adverse effects of the project as currently segmented, but also a full evaluation of adverse effects of the intended larger revetment project when considered in its entirety. The scope should also require analysis of feasible alternatives to the project which would better mitigate actual or probable adverse impacts to the coastal beach and downdrift areas on the eastern shoreline of Nantucket.

A. Segmentation

301 CMR 11.01(2)(c), requires, in relevant part, as follows:

> … during MEPA review, … the Secretary shall consider the entirety of the project, including any likely future expansion, and not separate phases or segments thereof … the Secretary shall consider all circumstances as to whether various work or activities constitute one project, including but not limited to: whether the work or activities, taken together, comprise a common plan or independent undertaking … and whether the environmental impacts caused by the work or activities are separable or cumulative.

The project currently under MEPA review is clearly a segment of a larger project and should not be allowed to proceed to a State permitting phase without requiring an Environmental Impact Report.

On July 2, 2013, SBPF filed a Notice of Intent with the Commission seeking approval for a stone armor revetment extending 4,253 linear feet along the coastline. While SBPF subsequently submitted revised filings, it has not withdrawn its original filing and has not given any indication that this is not the actual project as a whole for which it will ultimately be seeking approval. Further, although SBPF also subsequently partnered with the Town to seek approval for a lesser sized project, that project is still much larger than the segment for which it now seeks to bypass review in the form of an Environmental Impact Report.

On July 5, 2013, the Town, acting by and through its Board of Selectmen, and SBPF entered into a Memorandum of Understanding ("MOU") concerning a three-phase project to address erosion control issues at Sconset Bluff. See Exhibit 1 (Memorandum of Understanding Between the Town of Nantucket and Siasconset Beach Preservation Fund, Inc. for the Design, Permitting and Construction of a Coastal Erosion Structure and for the Protection and/or Relocation of Baxter Road). The MOU was expressly based upon a determination that "certain private homes located on or near Sconset Bluff and Baxter Road, a public way, may be imminently threatened with damage and/or loss and destruction due to severe erosion of the bluff which has intensified since the Winter of 2012-2013." The MOU was also entered into by the Board of Selectmen pursuant to a determination under Chapter 67 of the Town Code, Concerning Management of Coastal Properties Owned by the Town, "that an emergency exists that threatens public roads and other assets from imminent destruction."

The MOU calls for a project in three phases, as follows:

> The Project will be divided into three parts: (1) SBPF has proposed in Phase 1 the construction of a coastal erosion structure consisting of a rock revetment and reinstallation of the bluff walk for a distance of approximately 1,500 linear feet located between approximately 75 and 119 Baxter Road, as shown more specifically on the map attached hereto depicting the proposed project area and proposed phases of construction, (2) Phase 2 proposes the construction of an additional revetment to protect the remaining exposed bank on the north end in and around Phase 1 and moving south approximately 2,500 feet to the start of the eroding bank, and (3) Phase 3 includes the planning, design, permitting, and construction or relocation of Baxter Road and public utilities if it becomes necessary due to further coastal erosion.

The MOU, recognizing that a portion of the project would be constructed on Town-owned land, called for the Town to provide SBPF with a license to permit access. The MOU also provided for SBPF to file a Notice of Intent for Phase 1 of the project with the Commission by July 5, 2013.

On October 9, 2013, the Town and SBPF entered into an Amendment to the MOU (the "Amendment") superseding certain provisions in the original MOU but preserving all other terms and conditions not specifically superseded. See Exhibit 2 (Amendment to the Memorandum of Understanding Between the Town of Nantucket and Siasconset Beach Preservation Fund, Inc. for the Design, Permitting and Construction of a Coastal Erosion Structure and for the Protection and/or Relocation of Baxter Road). The Amendment was based on the fact that "certain of the facts and assumptions underlying the terms and conditions set forth in the original MOU have changed and/or no longer apply [and] the parties wish to enter into the Amendment so as to bring their agreement up to date."

The Amendment provides that such "changed facts and underlying assumptions include but are not limited to changes in the scope and timing of the erosion protection project and related actions, as well as changes which may result in a change to the funding mechanism referred to" in the MOU. The Amendment, however, most decidedly did not in any way provide that SBPF no longer intended to proceed with the larger coastal engineering project nor did it contemplate that the project now under MEPA review was designed as a stand-alone project intended as a permanent solution to the possible destruction of pre-1978 houses.

Rather, the Amendment is specifically targeted as an emergency project designed to provide temporary protection to the most threatened sections of the public way, Baxter Road, and related infrastructure, prior to the then upcoming 2013-14 Winter storm season.

Specifically, the Amendment provides that during the underlying hearing on SBPF's Notice of Intent on the project in its entirety, and based on the findings of the Town's engineering consultant, –

> the Town has identified two potential failures involving Sconset Bluff in the area of Baxter Road, including 1) global failure which would be a catastrophic bank failure caused by undermining at the toe of the bluff by wave action; and 2) local failure which would result along smaller sections of the bluff and is more likely to be caused by runoff discharging from the top of the bank and running down the exposed face of the bluff, so that there is an immediate need for emergency measures to protect Baxter Road and the associated utilities temporarily, in order to maintain vehicular access and utility service to the residential properties on Baxter Road;

See Exhibit 2, p. 1, 3d par.

The Amendment provides that SBPF and the Town shall apply as co-applicants for approval of an emergency project to protect Baxter Road temporarily in the areas where Baxter Road appeared to be in imminent danger due to erosion of Sconset Bluff, specifically from 85 to 107A Baxter Road. The Amendment also provides that the Town agree to assist in expediting the public hearing and related processes on the emergency project so that the Commission's hearing on the emergency project open on or before October 16, 2013, with the intent that emergency measures could proceed and be installed as soon as possible and prior to the 2013-14 Winter storm season.

Because the emergency project was being constructed on Town-owned land on the coastal beach located along the toe of the bluff, the Board of Selectmen entered into a License Agreement with SBPF permitting SBPF's entry to use the licensed premises to construct the coastal engineering structure "to the extent such structure is permitted by the Commission." See Exhibit 3 (License Agreement). The License Agreement is "revocable by the Town at its sole discretion" upon 60 days' written notice.

Thus, it is the emergency project, expressly and specifically intended as a temporary means for protecting the public way and related infrastructure during the 2013-14 Winter storm season, which is currently under MEPA review. However, it is the project as a whole, particularly those aspects of the larger project which are specifically intended to protect against destruction of pre-1978 houses located in the intended larger project area, which must be considered when determining whether to require the filing of an Environmental Impact Report. Accordingly, the Town and the Commission respectfully contend that an Environmental Impact Report is mandated under the segmentation regulation contained in 310 CMR 11.01(2)(c).

B. Alternatives Analysis

The Town and the Commission respectfully submit further than an Environmental Impact Report must be required in light of the substantial evidence on the record before the Commission of actual or probable damage to the environment arising from the project as currently proposed, and feasible alternatives which would lessen such actual or probable damage.

301 CMR 11.02 defines "Damage to the Environment," in relevant part, as:

> Any destruction or impairment (not including insignificant damage or impairment), actual or probable, to any of the natural resources of the commonwealth including, but not limited to, … destruction of seashores, dunes, marine resources, … wetlands, open spaces, [and] natural areas …

During the public hearing before the Commission on the underlying Notice of Intent, extensive evidence was presented concerning actual or probable damage to the environment as a

result of the structure as proposed, if allowed to remain permanently in place. See Exhibit 4 (submissions of Applied Coastal Research and Engineering, Inc., dated October 30, 2013 and November 8, 2013) and Exhibit 5 (submission of Jim O'Connell, Coastal Advisory Services, dated November 4, 2013). In summary, the main problem with the project as currently designed concerns the volume and timing of sediment/sand supply from the coastal engineering structure not accurately replicating the natural function of the coastal bank. The unnatural and insufficiently mitigated new function of the now hard-armored bank is likely to result in the loss of the coastal beach in front of the bank and will also adversely impact downdrift properties and resources within the littoral cell of the eastern shoreline of Nantucket. See Exhibit 5. It is also likely to result in scour and accelerated erosion on adjoining properties along the coastline immediately north and south of the project area. See Exhibit 4.

The record also contains evidence of feasible alternative projects which involve a higher and more effective degree of sand nourishment, and a softer surface in the areas of impact facing wind and wave action so that the release of sediment and sand more accurately replicates the natural function of the coastal bank. The softer project alternatives, such as a hybrid structure involving jute or coir components will more accurately replicate the natural sediment and sand supply which would otherwise come from the naturally eroding coastal bank and would more adequately mitigate actual or probable adverse effects upon the coastal beach and downdrift shoreline areas while at the same time providing the erosion protection intended by the project proponent.

While the softer project alternatives may possibly involve a higher cost and more intensive maintenance protocol, they are certainly feasible alternatives which would better replicate the natural functioning of an otherwise naturally eroding coastal bank. These alternatives should be fully vetted by the project proponent in light of the substantial and irreparable adverse environmental impacts substantiated in the record by highly qualified coastal engineering experts. In this regard, it is worth noting that the project proponent's conclusory claim of no feasible alternative projects is particularly suspect in light of the project proponent's own contradictory statement that the geotube project for which it now seeks approval was not a viable long term solution when it was seeking approval for the rock revetment armoring project. See Exhibit 6 (excerpt from SBPF's July 2, 2013 Notice of Intent). When seeking approval for the rock revetment, SBPF specifically represented that geotubes "are not well-suited to a high energy environment like Sconset" and "are not considered a viable long-term erosion control solution." At the very least, this representation renders it undeniable that this is a segmented project proposal which cannot be allowed to bypass an Environmental Impact Report.

Finally, it must also be noted that following the meeting conducted by MEPA officials at the office of MassDEP in Lakeville on September 5, 2014, the Commission offered to discuss alternate project proposals with SBPF in the context of agreed public remand proceedings. SBPF has declined this offer. This is unfortunate, as a continued public process before the local Commission provides the best forum for vetting alternate project proposals. This makes it particularly

appropriate for the Secretary to require a full alternatives analysis in an Environmental Impact Report for the project in question, not only for the segment of the project originally intended to temporarily protect the existing public way, but also for the intended project in its entirety, as referenced above.

Thank you for your consideration of the foregoing comments.

Very truly yours,

George X. Pucci

GXP/man
cc: Town Manager (by electronic mail)
Natural Resources Coordinator (by electronic mail)
David S. Weiss, Esq.
Steven L. Cohen, Esq.

506674/19705/0038

EXHIBIT
1

Memorandum of Understanding
Between
The Town of Nantucket
and
Siasconset Beach Preservation Fund, Inc.
for the Design, Permitting and Construction
of a Coastal Erosion Structure
and for the Protection and/or Relocation of Baxter Road

This Memorandum of Understanding ("MOU") is entered into this 5th day of July, 2013, by and between the Board of Selectmen of the Town of Nantucket (the "Town") and Siasconset Beach Preservation Fund, Inc. ("SBPF"), a Massachusetts 501(c)(3) corporation created by residents of Nantucket to protect historic homes and associated public infrastructure along Baxter Road in the Siasconset area of Nantucket; hereunto duly authorized.

WHEREAS, the Town and SBPF have determined that certain private homes located on or near Siasconset Bluff and Baxter Road, a public way, may be imminently threatened with damage and/or loss and destruction due to severe erosion of the bluff which has intensified since the Winter of 2012-2013;

WHEREAS, the Board of Selectmen has determined pursuant to Chapter 67 of the Town Code, Management of Coastal Properties Owned by the Town, that an emergency exists that threatens public roads and other assets from imminent destruction;

WHEREAS, both Parties have agreed to cooperate with one another to take prudent steps in an attempt to stabilize the coastal bluff thereby protecting the remaining privately-owned properties and structures and to ensure that Baxter Road remains open and accessible to provide safe access to the residents of Baxter Road and Sankaty Light, which may by necessity include the relocation and reconstruction of all or a portion of Baxter Road and public utilities that serve the residents in the area (the Project);

WHEREAS, the Board of Selectmen is committed to supporting measures that will have the likely effect of preventing damage to, or destruction of, Baxter Road as long as the Project as proposed by SBPF can be accomplished without resulting in further or additional coastal erosion, or other environmental damage, as may be determined by the Town's consultant, the Conservation Commission, and/or the Department of Environmental Protection;

WHEREAS, the Town and SBPF wish to set forth in this MOU the respective expectations of the Parties;

NOW THEREFORE, the Parties agree that the following framework and process will govern the cooperative effort to accomplish the goals set forth in this MOU.

1. The Project will be divided into three parts: (1) SBPF has proposed in Phase 1 the construction of a coastal erosion structure consisting of a rock revetment and reinstallation of the bluff walk for a distance of approximately 1500 linear feet located between approximately 75 and 119 Baxter Road, as shown more specifically on the map attached hereto depicting the proposed project area and proposed phases of construction, (2) Phase 2 proposes the construction of an additional revetment to protect the remaining exposed bank on the north end in and around Phase 1 and moving south approximately 2,500 feet to the start of the eroding bank, and (3) Phase 3 includes the planning, design, permitting, and construction or relocation of Baxter Road and public utilities if it becomes necessary due to further coastal erosion. A portion of the Project may be constructed on Town-owned land. In such event, the Town will provide SBPF with a license or other legal instrument to permit access to the Town land.

2. The Town will undertake steps forthwith to hire an independent consultant to conduct a peer review of SBPF's plan to stabilize the coastal bank by installing the revetment. The Town's consultant will also provide an assessment to the Town regarding the likelihood that the Project will achieve the intended result of stabilizing the coastal bank, and, in particular, that it will likely preserve Baxter Road. The agreed scope of the Town's consultant review is more fully set forth in the memorandum prepared by the DPW Director dated June 24, 2013, titled "Baxter Road engineering scope," which is incorporated herein by reference. As an additional scope of work, and subject to a further agreement on funding, the Town's Consultant will also provide a conceptual plan for providing alternative access to the residences served by Baxter Road in the event it becomes necessary, and will assist in the preparation of a survey to determine the ownership of the land on which the Project will be located. The Town shall afford SBPF a reasonable opportunity to review and comment on the scope of work for the Town's consultant study.

3. SBPF will file a Notice of Intent ("NOI") for Phase 1 with the Conservation Commission by July 5, 2013. The submission will be prepared by SBPF at its sole cost and expense, and SBPF will take the lead in the permitting effort. To the extent Town land is required for the Project, the Board of Selectmen hereby consents to the use of Town land in connection with the Project and agrees to sign off on the NOI as a landowner. This consent by the Town is subject to a report and recommendation from the Town's Consultant, and the Board of Selectmen reserves the right to withdraw its consent and support at any time.

4. SBPF agrees forthwith to provide a gift to the Town in an amount reasonably necessary to pay for the first phase of the Town's consultant study. SBPF also agrees immediately to provide funds to the Town in an amount sufficient for the reasonable and necessary legal fees and other costs incurred by the Town to implement this MOU through the completion of Phase 1. SBPF also agrees to further reimburse the Town for reasonable and necessary consultant and legal fees through the completion of Phases 2 and 3 in amounts agreed to by the Parties prior to commencing any work. If, at any time, the Town determines that additional reasonable and necessary consulting and legal fees or other expenses will likely be incurred, the Town will promptly notify SBPF

and SBPF shall make a further contribution of funds to the Town for its agreed upon share.

5. Assuming the necessary order of conditions is issued, SBPF will construct Phase 1 at its sole cost and expense commencing as soon as the required permits are issued and become final. It is hoped that this will be accomplished by early Fall 2013. SBPF acknowledges, however, that the Board of Selectmen has no control over the hearing process or the ultimate decision that the Conservation Commission may make, although the Board agrees that it will cooperate with SBPF in supporting the application process.

6. Prior to the construction of Phases 2 or 3, SBPF and the affected homeowners, including those located within proximity of the Project, will provide release and indemnification agreements to the Town, consents to easements and waivers of damages in the case of any taking by the Town which is necessary for the relocation and/or reconstruction of Baxter Road, or any other portion of the Project, and consents to betterment assessments, where appropriate, and SBPF shall also obtain to the fullest extent possible releases from homeowners potentially affected by the Project. SBPF agrees to commence immediately and to diligently pursue obtaining the consents and waivers as set forth in the paragraph. The Town shall have no obligation to proceed with Phases 2 or 3 unless it is satisfied that appropriate waivers and releases have been secured. SBPF will establish and fund an escrow account in an amount reasonably acceptable to both Parties to be used for the maintenance and repair of any coastal erosion structures that are constructed under Phase 1. SBPF shall also provide further funding as reasonably agreed by the parties in advance of Phase 2 and 3. The escrow agreement will provide a trigger mechanism for maintenance of the fund at an agreed upon level and will be replenished by the SBPF if the balance in the fund falls below the agreed-upon minimum level.

7. Because construction of Phase 1 will be performed solely by SBPF, the Parties believe there will be no requirement that the Massachusetts Public Bidding Laws be followed and the project will not be subject to the Prevailing Wage Law. The Town, however, makes no specific assurance in this regard, and the Parties acknowledge that SBPF and the Town will be required to follow all federal, state, and local laws and regulations applicable to the Project.

8. The Parties agree to diligently pursue the permitting, design, and construction of Phases 2 and 3 of the Project (if necessary) including an agreement on cost sharing and possible betterment assessments. If the cost of construction in either Phase 2 or 3 involves the proposed expenditure of Town funds, the Board of Selectmen shall vote whether to support such expenditure and the project will require and be conditioned on a Town Meeting appropriation at a Special or Annual Town Meeting. Construction work will be subject to the Massachusetts Public Construction Laws including the Prevailing Wage Law.

9. The Parties recognize that the order of the work in the three phases may have to be adjusted depending on the pace of continued erosion.

10. The Parties acknowledge that the ability to proceed with the Project is subject to the availability of funds including, in the case of the Town, an appropriation from Town Meeting, and it is dependent on the receipt of all required permits and approvals in a form reasonably satisfactory to both Parties.

11. If, at any time, either Party determines that it is not practical or prudent to proceed with the Project, this MOU may be terminated and shall have no further force or effect, except that to the extent SBPF has agreed to provide funding to the Town for any consulting, legal, or other services, SBPF shall be obligated to complete any funding obligations. Furthermore, any indemnification, betterment assessment, waiver of damages, or release agreements that have been executed, shall survive termination of this MOU.

Entered into the date and year written above.

Town of Nantucket

By its Board of Selectmen

Siasconset Beach Preservation Fund, Inc.

By its President

476088v.4/nant/0001

Baxter Road and Sconset Bluff Storm Damage Prevention Project Nantucket, MA

Figure 2
Aerial Locus

EXHIBIT
2

Amendment to the Memorandum of Understanding Between The Town of Nantucket and Siasconset Beach Preservation Fund, Inc. for the Design, Permitting and Construction of a Coastal Erosion Structure and for the Protection and/or Relocation of Baxter Road

This shall serve as an amendment ("Amendment") to the Memorandum of Understanding ("MOU") entered into on July 5, 2013, by and between the Board of Selectmen of the Town of Nantucket (the "Town") and Siasconset Beach Preservation Fund, Inc. ("SBPF"), a Massachusetts 501(c)(3) corporation created by residents of Nantucket to protect historic homes and associated public infrastructure along Baxter Road in the Siasconset area of Nantucket; hereunto duly authorized. Any and all terms and conditions of this Amendment which are inconsistent with the terms and conditions contained in the MOU are expressly intended to supersede such terms and conditions so that they shall no longer apply. All other terms and conditions shall remain in full force and effect.

WHEREAS, certain of the facts and assumptions underlying the terms and conditions set forth in the original MOU have changed and/or no longer apply, the parties recognize and wish to enter into this Amendment so as to bring their agreement up to date. Such changed facts and underlying assumptions include but are not limited to changes in the scope and timing of the erosion protection project and related actions, as well as changes which may result in a change to the funding mechanism referred to in numbered paragraph 7 of the MOU;

WHEREAS, during the public hearings on SBPF's underlying NOI and the findings of the Town's engineering consultant, the Town has identified two potential failures involving Siasconset Bluff in the area of Baxter Road, including 1) global failure which would be a catastrophic bank failure caused by undermining at the toe of the bluff by wave action; and 2) local failure which would result along smaller sections of the bluff and is more likely to be caused by runoff discharging from the top of the bank and running down the exposed face of the bluff, so that there is an immediate need for emergency measures to protect Baxter Road and the associated utilities temporarily, in order to maintain vehicular access and utility service to the residential properties on Baxter Road;

WHEREAS, the Town's engineering consultant has also determined that there is an immediate need for an emergency response action plan outlining how the Town will provide emergency vehicular access, water supply and sanitary sewer service to the residences at the north end of Baxter Road in the event of a failure of the roadway and that there is also a need for long-term planning for the potential eventual loss of Baxter

Road regardless of whether temporary and/or permanent protection measures for Siasconset Bluff are ultimately approved by the Town's Conservation Commission and the Massachusetts Department of Environmental Protection;

NOW THEREFORE, the Parties agree to the following amended course of action to that agreed to in the original MOU:

1. SBPF and the Town shall apply, as co-applicants, for approval of an emergency project to protect Baxter Road temporarily in the areas where Baxter Road appears to be in imminent danger due to erosion of Siasconset Bluff, specifically from 85 to 107A Baxter Road. SBPF shall pay for all engineering and construction costs related to such project, maintenance and repair of any approved installation, and mitigation and/or removal of any approved temporary protection installation in the event of failure of, or damage caused by such installation and shall also indemnify the Town against liability arising from damage caused by such installation.

2. SBPF shall provide funding for professional services for the Town including legal, engineering, and survey services, to formulate an emergency action plan outlining how the Town will provide emergency vehicular access, water supply, and sanitary sewer service, to the residences at the north end of Baxter Road, and shall ensure that utilities are notified and requested to provide an emergency response action plan for the relocation of electric, telephone and cable utility service to the area.

3. SBPF shall assist the Town with respect to long-term planning for the possible eventual loss of Baxter Road, regardless of whether a permanent coastal engineering structure is ultimately approved by the Conservation Commission, and SBPF agrees to assist the Town in preparing for "springing easements" triggered by the Town and/or County if there is a failure of Baxter Road, the criteria for which shall be established as soon as possible with the intent that the Town and/or County can act promptly in the event of such failure, to construct alternative access. SBPF shall provide the necessary funding for engineering and design services for construction of one or more alternative roadways, as well as funding necessary for surveys, preparation of easement taking plans, and appraisals for the relocation of Baxter Road. SBPF shall also endeavor to obtain easements or access agreements from private property owners so that takings can be avoided or minimized to the fullest possible extent.

4. The Town agrees to assist in expediting the public hearing and related processes on the emergency project so that the Conservation Commission's hearing on the emergency project opens on or before October 16, 2013, with the intent that emergency measures can proceed and be installed as soon as possible, and prior to the Winter, 2013/14 storm season. To the extent Town land is required for this emergency project, including access thereto, the Town by its Board of Selectmen hereby consents to such use, subject to permitting and applicable law.

Entered into this 9th day of October, 2013.

Town of Nantucket

By its Board of Selectmen

Siasconset Beach Preservation Fund, Inc.

By its President

483036/19726/0001

EXHIBIT
3

LICENSE AGREEMENT

THIS AGREEMENT is entered into this 13 day of December, 2013, by and between the Town of Nantucket, a body politic and corporate and a political subdivision of the Commonwealth of Massachusetts, acting by and through its Board of Selectmen, having an address of Town & County Building, 16 Broad Street, Nantucket, Massachusetts 02554 (the "Town"), being the owner of Assessor's Parcel 48-8 in said Nantucket (the "Town Property") and Siasconset Beach Preservation Fund, Inc. ("SBPF"), a Massachusetts 501(c)(3) corporation created by residents of Nantucket to protect homes and associated public infrastructure along Baxter Road in the Siasconset area of Nantucket, and the owners of private properties (the "Private Property Owners") located along Baxter Road ("the "Private Property"), as listed on the signatory page of this document. SBPF represents and expressly warrants that it is a corporate entity with the legal authority to contract under state and federal law, and that the undersigned has express authority to sign this license as a binding contract on its behalf. SBPF shall also provide the Town with such corporate documents as are necessary to confirm these representations and warranty.

WHEREAS, the Town and the Private Property Owners are the owners of record of portions of the Town Property and the Private Property shown on a plan attached hereto as Exhibit A (the "Licensed Premises");

WIIEREAS, the Town and SBPF have entered into a Memorandum of Understanding and Amendment to the Memorandum of Understanding agreeing that the Town and SBPF shall apply, as co-applicants, for approval of an emergency project (the "Project") to protect Baxter Road temporarily in the areas where Baxter Road appears to be in imminent danger due to erosion of Siasconset Bluff, specifically from 85 to107A Baxter Road; and

WHEREAS, the Town and SBPF, with the assent of the Private Property Owners have filed applications with the Nantucket Conservation Commission (the "Commission") for approval of the Project, which, if approved, would involve the entry upon and use of the Licensed Premises for construction of a coastal engineering structure upon the Licensed Premises, including the associated supplemental erosion protection, and associated inspections, repairs and mitigation activities, as described in the application materials to the Commission.

NOW, THEREFORE, in consideration of the mutual promises and covenants herein made, the parties hereto agree as follows:

1. The Town and the Private Property Owners hereby grant to SBPF a non-exclusive license to enter and use the Licensed Premises to construct a coastal engineering structure to the extent such structure is permitted by the Commission, including the associated supplemental erosion protection, and associated inspection, repairs and mitigation activities and expressly subject to

any and all conditions which the Commission shall impose upon such permit, and subject also to any and all other federal, state, or local laws, bylaws, regulations or code provisions which may apply to the project, including applicable provisions of the Massachusetts Public Construction laws, including without limitation G.L. c. 30, § 39M relating to construction of public works projects, and any applicable provisions of G.L. c. 149 relating to the payment of prevailing wages, as may be determined by the Town in its sole discretion prior to SBPF entering into any contract for construction work on Town Property. Such entry and use shall be exercised from the date of the execution of this License, with no work altering the Licensed Premises to commence until the date upon which any permit from the Commission shall become effective, and shall continue until such date as it is terminated or the entry and use is no longer permitted in accordance with the conditions imposed upon the project by the Commission. The Private Property Owners also agree to grant the Town the necessary easements for a One Big Beach Easement as shown on a plan and in a form to be mutually agreed upon. The Town and the Private Property Owners make no representation or warranty, by said grant of license hereby or otherwise, that they have title to or rights in the Licensed Premises or that the Licensed Premises may be used for any purpose other than that expressly permitted and conditioned by the Commission. SBPF acknowledges that it has not relied upon any warranties or representations of the Town or the Private Property Owners nor any person acting on their behalf, and that SBPF agrees to accept the Licensed Premises "as is", with no liability on the part of the Town or the Private Property Owners for any condition or defect of title in the Licensed Premises, whether or not known to the Town or the Private Property Owners or any representatives. The terms of this paragraph shall survive the termination of this License.

2. SBPF shall own any coastal engineering structure and associated erosion control measures which may be permitted by the Commission and installed on the Licensed Premises. SBPF shall be solely responsible for the design and construction of the structure and the means, methods and techniques used for building the structure in accordance with the conditions imposed by the Commission and shall also bear all costs of design and construction. SBPF shall also be solely responsible for all costs necessary for maintenance and repair of the structure in accordance with any and all conditions of approval from the Commission, including the costs of any required mitigation, such as sand replenishment. SBPF shall also be solely responsible for the costs of removal of the structure upon either expiration of any deadline set forth in the Commission's Order of Conditions or prior thereto if removal is validly ordered by the Commission, or by the Board of Selectmen in connection with any revocation of this License and shall also be solely responsible for the cost of restoration of the Licensed Premises to the condition of the Licensed Premises at the time of the commencement of this License or if that is not possible, to conditions that restore the form and function of the disturbed bank

and beach to the fullest extent reasonably possible as approved by the Commission. SBPF shall provide the Town with a letter of credit or surety funds in an amount to be confirmed by the Director of Public Works and form satisfactory to the Town in order to secure the faithful performance of any of the foregoing obligations should SBPF fail to fulfill its obligations under this License Agreement, or the reasonable costs of removal and restoration, which shall remain in effect until the completion of all obligations under this License to the Town's reasonable satisfaction.

3. SBPF agrees to indemnify, defend with counsel of the defendant's choosing, and hold the Town and the Private Property Owners harmless from and against all claims, demands, losses, costs, damages, causes of action, or liabilities whatsoever, including but not limited to mechanic's liens and reasonable attorney's fees and expenses, which may be imposed upon, incurred by, or asserted against the Town or the Private Property Owners, or their respective agents, employees, successors and assigns of either by third parties by reason of (a) the construction, maintenance, mitigation, or removal of, any coastal engineering structure permitted by the Commission and any failure on the part of SBPF, its agents, contractors, or representatives to comply with any condition required to be performed or complied with by SBPF by the Commission; (b) for death, bodily injury or property damage suffered by any person on account of or based upon the act, omission, fault, negligence or misconduct of any person whomsoever, other than the defendant, relating in any way, to SBPF's exercise of its rights under this License; (c) any claims seeking damages for alleged adverse effects arising from the construction of the coastal engineering structure including but not limited to alleged adverse effects to downdrift properties, claims for takings, property damage, loss of use, negligence, nuisance, trespass, or diminution of property value; (d) the discharge, release or threatened release at or from the Licensed Premises of oil or hazardous material as defined under federal, state or local law which is caused by SBPF, its agents, contractors, or representatives under this License. The terms of this paragraph shall survive the termination of this License.

4. SBPF will be solely responsible for any hazards created through SBPF's acts or omissions in connection with this License. Furthermore, SBPF and the Private Property Owners hereby release the Town and the County of Nantucket (the "County"), from any and all claims and liabilities of every kind, nature and description whatsoever, whether known or unknown, in both law and equity, which they have or may have had from the beginning of the world to the date of execution of this License, and more particularly with respect to any alleged acts or omissions of the aforesaid released parties concerning Baxter Road, erosion of Siasconset Bluff, and any related subject matter. SBPF and the Private Property Owners also release the Town and the County from any responsibility or liability for SBPF's or the Private Property Owner's losses or damages related to the condition of the Licensed Premises,

and agree and covenant that they will not assert or bring, nor cause any third-party to assert or bring any claim, demand, lawsuit or cause of action against the Town related to the Licensed Premises including without limitation, claims for takings, property damage, loss of use, negligence, nuisance, wrongful death, trespass, diminution in property value, personal injury damages and any other damages relating to or arising from the SBPF's use of the Licensed Premises. The provisions of this Paragraph shall survive the termination of this License.

5. SBPF also agrees to provide all funding for engineering and design services for the layout of a new public road, as well as funding for surveys, preparation of easement taking plans and appraisals.

6. This License shall not be construed as creating or vesting in the Licensees any estate in the Licensed Premises, but only the limited right of entry and use as hereinabove stated.

7. This License is personal and exclusive to SBPF and is not intended to run with the land. This License may not be transferred or assigned without the express written consent of the Town.

8. This License represents the complete understanding and entire agreement between the parties hereto with respect to the entry and use of the Licensed Premises. The terms of the aforesaid Memorandum of Understanding and Amendment to the Memorandum of Understanding shall remain in full force and effect to the extent they are consistent with this License. To the extent such terms are inconsistent, the terms of the License shall govern and any inconsistent terms shall be superseded and of no effect.

9. This License is to be interpreted under and construed in accordance with the laws of the Commonwealth of Massachusetts. If any portion of this License is deemed to be illegal, unenforceable or void by a court of competent jurisdiction, then all parties shall be relieved of their obligations under that provision, but the remainder shall be enforceable to the fullest extent permitted by law.

10. SBPF shall procure all necessary permits before undertaking any work on the Licensed Premises. The siting of the coastal engineering structure and associated activities shall be performed in accordance with the conditions set by the Commission. SBPF shall not permit any mechanics' liens or similar liens, to remain upon the Licensed Premises for labor and material furnished to SBPF or claimed to have been furnished to SBPF in connection with any work performed or claimed to have been performed at the direction of SBPF and SBPF shall cause any such lien to be released forthwith at no cost to the Town. During the exercise of the rights hereby granted, SBPF shall at all times conduct itself so as to not unreasonably interfere with the use or

operations of the Town on the Town Property, and the use of the Private Property by the Private Property Owners. The SBPF shall at all times comply with all applicable local, state, and federal rules, regulations, statutes and by-laws, and the permits and conditions issued for the project on the Licensed Premises.

11. This License shall be revocable by the Town at its sole discretion upon written notice of revocation at least sixty (60) days prior to the termination date stated within said notice. In the event that this License is terminated, then SBPF at its own expense shall remove the structure from the Licensed Premises and restore the Licensed Premises to the condition at the time of the commencement of this License and if this is not possible, to conditions that restore the form and function of the disturbed bank and beach to the fullest extent reasonably possible as agreed to by the Commission. This obligation shall survive the termination of this License.

12. SBPF shall maintain during the term of this License public liability insurance, including coverage for bodily injury, wrongful death and property damage, and coverage for any of the claims referenced in paragraphs 3 and 4 above, in the following minimum amounts: General Liability $10,000,000 per occurrence; Bodily Injury Liability $10,000,000 per occurrence; and Property Damage Liability or a combined single limit of $10,000,000 annual aggregate limit. Prior to entering upon the Licensed Premises, and thereafter on or before January 1 of each year of the term of this License, SBPF shall provide the Town with a certificate of insurance in each case indicating the Town as an additional insured on the policy and showing compliance with the foregoing provisions. SBPF shall require the insurer to give at least thirty (30) days written notice of termination, reduction or cancelation of the policy to the Town. SBPF or its contractors shall maintain workmen's compensation insurance during any site work, maintenance or repair on the Licensed Premises, as required by law. SBPF agrees that while any contractor is performing work on behalf of SBPF at the Licensed Premises the contractor shall carry liability insurance and automobile liability insurance in amounts of General Liability and Automobile Liability insurance in amounts of $3,000,000.00, combined single limit and shall name the Town as an additional insured party. Prior to any construction or site work on the Licensed Premises performed by SBPF or any contractor on behalf of SBPF on the Licensed Premises, SBPF shall provide the Town with a copy of the contractor's insurance certificate indicating liability insurance coverage as herein specified, and copies of any approval, permits, necessary or obtained to construct or siting of the dwelling and any construction or excavation work.

13. The Town reserves the rights and SBPF shall permit the Town to enter upon and use that portion of the Licensed Premises situated on the Town Property at any time and for all purposes at the Town's sole discretion provided it does

not unreasonably interfere with the operations of the SBPF on the Licensed Premises.

14. All notices given pursuant to this License shall be in writing and sent to the other party at the address set forth in the first paragraph hereof, by United States Mail or overnight express courier. Either party may, from time to time, specify one additional party to receive written notice in order for such notice to be binding.

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EXECUTED as an instrument under seal as of the date first above written.

TOWN OF NANTUCKET
By its Board of Selectmen

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Siasconset Beach Preservation Fund, Inc.

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TOWN OF NANTUCKET
By its Board of Selectmen

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Siasconset Beach Preservation Fund, Inc.

By:_____ Duly Authorized, President

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By: Laurie C McEdwards

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EXECUTED as an instrument under seal as of the date first above written.

TOWN OF NANTUCKET
By its Board of Selectmen

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TOWN OF NANTUCKET
By its Board of Selectmen

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105 Baxter Road Moira B. Malkasian

By: Marilee B MacKesson

107 Baxter Road

By_____

107A Baxter Road

By:_____

101 Baxter Road LLC

By: J. Walker III, on behalf of Member of "101 Baxter Rd LLC"
James E. Walker, III, Manager

105 Baxter Road

By:

107 Baxter Road

By

107A Baxter Road

By:

EXHIBIT
4

Applied Coastal Research and Engineering, Inc.
766 Falmouth Road
Suite A-1
Mashpee, MA 02649

MEMORANDUM

Date: **October 30, 2013**

To: **Emily MacKinnon and Cormac Collier, Nantucket Land Council**

From: **John Ramsey, P.E. and Trey Ruthven**

Subject: **Baxter Road Temporary Stabilization Application**

We have reviewed the Baxter Road Temporary Stabilization Application in conjunction with the additional information submitted by Milone & MacBroom, Inc. (MMI) in support of the application. Similar to the previous projects that have been proposed along Sconset Bluff, Applied Coastal is concerned with the inadequacies of proposed mitigation efforts. Another concern is the scale of the proposed project which has been characterized as temporary, but has several design features which are characteristics of permanent coastal engineering structures.

Mitigation

The proposed geotubes structure is designed to act in a similar manner to a revetment by isolating the coastal bank and beach from erosive forces. By cutting off the supply of material from the coastal bank to the littoral system the project will shift and magnify erosion onto adjacent Town owned beach and neighboring properties along the coastal bank which already face significant erosional concerns. Therefore the geotube structure should be accompanied by an appropriate mitigation plan to offset adverse impacts associated with the coastal engineering structure. MMI presents the following table to illustrate the volume of sand nourishment provided:

Placement Location	Rate of Placement (CY/LF)	Length of Placement (Feet)	Total Volume (CY)
Inside Geotubes	4.22 (each tube)	1,500	25,320
Leveling Sand	2.3	1,500	3,450
Nourishment Sand	14.3	1,500	21,450
		TOTAL VOLUME	50,220

*Reproduced from MMI's October 25, 2013 letter to the Conservation Commission

The first and largest volume listed within the table is the 25,320 CY of sediment contained within the geotubes. The sediment within the geotubes should not be considered mitigation nourishment, since the sediment is isolated from the littoral system within the geotubes and provides no mitigation value to the shorelines updrift and downdrift of the proposed structure. The leveling sand should also not be considered mitigation nourishment; the sediment is isolated from the littoral system behind the geotubes and the geo-textile scour apron. The remaining nourishment volume, 21,450 CY, equates to 14.3 CY/LF which is significantly below the volumes naturally contributed to the beach from the bluff as calculated by:

- Massachusetts Coastal Zone Management – 15 to 26 CY/lf/year (Letter to the Conservation Commission dated August 26, 2013)
- Coastal Planning & Engineering, Inc. (Siasconset Beach Preservation Fund (SBPF) engineering consultant) – 24.2 CY/lf/year from the sediment budget developed for the period 1995 to 2005 submittal on behalf of SBPF to Nantucket Conservation Commission in November 2006
- SBPF's 2012 Notice of Intent for gabion project (produced by SBPF consultant Epsilon Associates, Inc.) – 19.1 to 19.5 CY/lf/year (these values excluded 13% of the total volume eroding from the bank due to fines, with the inclusion of fines the erosion rate is 20.8 to 22.2 CY/lf/year).
- Ocean and Coastal Consults, Inc. (SBPF engineering consultant) – 20.7 CY/lf/year from the September 2010 Siasconset Coastal Bank Stabilization and Beach Preservation Project Alternatives Analysis submittal on behalf of SBPF to Nantucket Conservation Commission.

Based on annual bank and beach sediment contribution rates previously provided by SBPF, it appears that the mitigation nourishment volume should be closer to 22 CY/lf/year (33,000 CY per year) which is the average of the three sediment contributions presented previously by SBPF consultants. The purpose of mitigation nourishment is to maintain the sediment supply that naturally erodes from the coastal bank system that is impounded by the structure. Once the proposed geotube revetment prevents erosion of the coastal beach and bank, coastal beach and bank materials are no longer available to supply downdrift beaches which in turn increase erosion on adjacent shorelines. Therefore an appropriate mitigation volume should be required on an annual basis to mitigate for the sediment lost from the littoral system. This mitigation volume would be based on long-term historical rates (see bullets above) and would be supplied regardless of monitoring results.

The placement protocol provided for the mitigation nourishment calls for the covering of the geotubes with a minimum of two feet of cover in addition to creating a bench that extends approximately 20 feet from the bank and slopes down the beach at 2.5 : 1 (horizontal : vertical). The placement of mitigation nourishment over the top of the geotubes up to an elevation of +28 feet (16 feet above the 100-Year base flood elevation) places a significant volume of the mitigation outside of the active littoral zone, thereby reducing the effectiveness of the mitigation to moderate the downdrift impacts associated with the construction of a coastal engineering structure on neighboring coastal beaches and banks. The mitigation nourishment should be placed in a sacrificial berm at the back of the beach to keep sediment within the littoral system. If there is not sufficient room for a sacrificial berm, the mitigation could be placed north and south of the geotube revetment structure. If a layer of sediment is required to cover the geotubes due to engineering/material constraints or for aesthetic concerns, then an additional volume of sediment should be provided for separately in a similar fashion to the sediment required to fill the geotubes and level the coastal bank during construction. This aesthetic coverage should not be considered mitigation.

The applicant should provide clarification to the Conservation Commission about the intended use of the excavated beach material associated with the placement of the fourth geotube below the existing beach face. The utilization of the fourth geotube will displace approximately 7,200 CY of beach material. That beach material is currently available to updrift and downdrift beaches within the littoral system should erosion occur, if the displaced beach material is utilized for

geotube filling, leveling of bank, mitigation nourishment, etc. it would represent a loss of beach material and hence should be appropriately mitigated for with additional beach nourishment.

Temporary Geotube Revetment

The scale of the proposed geotube revetment structure appears to be uncharacteristic of the design goal stated below,

> *Work under this application is specifically proposed as temporary and intended to provide a minimum but adequate level of protection for the short term while long term solutions are explored and implemented* (MMI's October 25, 2013 letter to the Conservation Commission)

The Alternatives Analysis excludes two geotube options that clearly meet the stated design goal more appropriately then the selected Four-Geotextile-Tube Configuration that was selected. Geotube Alternative 1 – Jute Fiber Logs have been shown to work over a number of years at 79 Baxter Road. A quick glance at any recent aerial photograph shows that the Jute Logs and terracing have minimized the loss of coastal bluff relative to adjoining lots. This is further confirmed in Figure XX from Epsilon Associates, Inc. which shows the bank at 79 Baxter Road did not erode over the April 2003 to March 2012 time period (the figure was submitted in conjunction with July, 2013 NOI for Baxter Road And Sconset Bluff Storm Damage Prevention Project). The key disadvantage listed in the exclusion of this alternative is degradation of the material over time; however, the proposed project is temporary, not permanent, thus degradation of the jute material over time should not be an exclusionary criteria for rejecting the Jute Fiber Log alternative. The Jute Fiber Log alternative appears to offer the least detrimental solution for protecting the coastal bank while maintaining littoral transport and minimizing the adverse impacts to adjacent properties.

The second excluded option, Geotube Alternative 2- Three-Geotextile-Tube Configuration was the preferred alternative in October 4, 2013 submission to Conservation Commission by MMI. The three geotube alternative eliminates the significant excavation of the coastal beach that is required with the four geotube alternative. To place the fourth geotube below the beach face, the contractor will have to excavate into beach approximately 10 feet in depth and greater than 30 feet in width. Once the geotube is in placed beneath the beach, it will displace approximately 7,200 CY of beach sediment. If the proposed project were not temporary in nature, such design details may be warranted; however, for a temporary project that seeks to provide the minimum level of protection the inclusion of the fourth geotube is does not appear warranted.

The overall height of the geotube options that are being evaluated is also excessive. The still water elevation for the FEMA predicted 100-Year Event is 10.2 feet, the top crest of the geotubes extends to elevation 26.0 with an additional two feet of sand cover over that. This project is a temporary solution, not a permanent coastal engineering structure. The overall structure height should be reduced to reflect the temporary nature of the project and reduce the overall impacts to the coastal bluff. If additional protection is required over the short design life of the project, it is recommend that additional sand nourishment be provided to dissipate wave and storm energy.

Monitoring and Maintenance Requirements

The Conservation Commission should require additional transects be added to the current Shoreline Monitoring conducted by SBPF. A revised monitoring plan should be submitted which includes additional transects on regular intervals (50-100 foot intervals) immediately updrift and downdrift of the proposed project to monitor the project for end effects and increased erosion along the adjacent shoreline and coastal bank. The monitoring survey should be conducted pre- and post-

nourishments to allow for quantification of shoreline variations and movements after the revetment is constructed. This near-field monitoring is critical to ensure that the structures are not having adverse impacts on adjacent properties due to 'end effects'.

The mitigation plan should be conservative; the purpose of mitigation nourishment is to maintain the sediment supply that naturally erodes from the coastal bank. Once the geotube revetment prevents erosion of the coastal bank, coastal bank materials are no longer available to supply downdrift beaches. Therefore, the minimum annual mitigation should be based on the historic erosion rate rather than monitoring results. Monitoring should only be utilized to indicate where placement of mitigation material is critical. The placement of beach nourishment mitigation should not be limited to the area of the project. Due to the large volume of annual mitigation that would be required for this project, it is likely that the beach fronting the revetment will not be able to hold the volume of annual nourishment required; therefore, the Town should consider placement of nourishment both north and south of the proposed geotube limits.

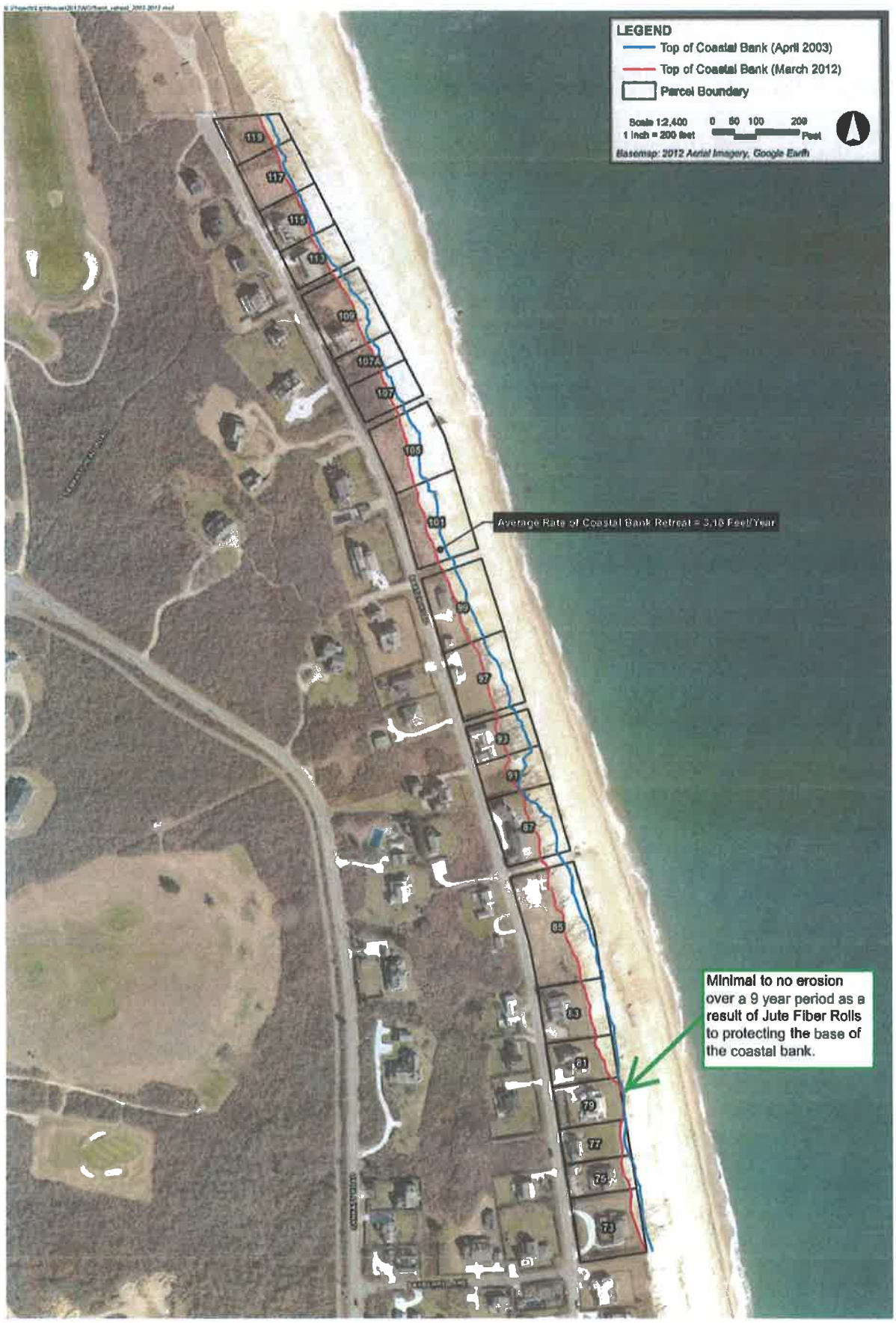
Due to the large volumes of sediment associated with the construction of the geotubes, it is critical that the sediment associated with the mitigation nourishment not potentially be misplaced or redirected during the construction of the project. The mitigation nourishment needs to be placed on the beach to maintain the sediment supply that naturally erodes from the coastal bank. It is recommended that Conservation Commission require truck delivery slips stating the weight of sediment delivered be complied into an engineering report illustrating the sediment requirements for each phase of the project and then stamped and certified by the design engineer to attest that the prescribed mitigation volumes have been placed.

Failure Criteria and Removal

The failure and removal criteria lack the necessary clarity and detail to evaluate the possible failure of the geotube structure in the future. For instance, *complete loss of one or more tubes*, what does *complete loss* mean? Would differential settlement along the structure length which results in the displacement/twisting of a geotube and results in a rupture of the geotextile fabric to an extent that it must be replaced or be partially emptied of sediment to be repaired represent a complete loss? If a geotube is flanked, what is the length of time that should be allowed to mitigate for the flanking, is a period of 7 days sufficient? In general the failure criteria presented is not quantitative. In addition the monitoring requirements associated with the application do not provide for quantitative assessment of the failure criteria. Therefore, there should be specific monitoring requirements associated with the failure criteria.

Conclusions

Reviewing the narrative presented within the NOI for the 2013 Baxter Road Temporary Stabilization Application illustrates that regardless of the stated temporary and minimal nature of the proposed project, the proposed geotube structure will cut off the supply of material from the coastal bank to the littoral system. Failure to adequately mitigate for the project will shift and magnify erosion onto adjacent Town owned beach and neighboring properties along the coastal bank. Analysis provided by SBPF, indicates that the minimum annual mitigation nourishment should be on the order of 22 CY/lf/year or approximately 33,000 CY per year. That mitigation volume would provide for one-to-one mitigation of the material that is currently being provided from the coastal bank to the littoral system. It is important to note that the one-to-one mitigation does not account for any additional erosion which is likely to occur due to end effects, wave reflection, and disturbance of the coastal bank and beach during construction. The goal of mitigation is not to prevent erosion in front of the proposed structure, but to prevent the acceleration of erosion on adjacent shorelines.



Baxter Road and Sconset Bluff Storm Damage Prevention Project Nantucket, MA

Figure XX

2003-2012 Coastal Bank Retreat (Average of 3.18 Feet/Year)

Applied Coastal Research and Engineering, Inc.
766 Falmouth Road
Suite A-1
Mashpee, MA 02649

MEMORANDUM

Date: **November 8, 2013**

To: **Emily MacKinnon and Cormac Collier, Nantucket Land Council**

From: **John Ramsey, P.E. and Trey Ruthven**

Subject: **2nd Response Regarding the Baxter Road Temporary Stabilization Application**

We have completed a brief review of the supplemental information provided by Milone & MacBroom (letter signed by Nicolle Burnham, P.E. dated November 1, 2013 with attachments) regarding "Issues raised at Conservation Commission Meeting of October 30, 2013" relative to the Baxter Road Temporary Stabilization Application. The latest information provided a design that is substantially the same as presented during the latest Conservation Commission Hearing, without any further analysis of other potential stabilization techniques that could provide short-term stability to the bank with fewer adverse impacts.

Overall, there is a concern that the analysis provided by Milone & MacBroom to support the design and mitigation for the project is *highly dependent* on the previous (and/or ongoing) work of SBPF and their consultants. One primary area of scientific and engineering disagreement is related to the calculation of *minimum* annual nourishment requirements for coastal armoring project of the scale proposed previously by SBPF and now by the Town of Nantucket. In addition, the application remains unclear regarding the actual volume that will be placed on the beach for mitigation, as opposed to other material placed inside the geotubes, placed above the 100-year flood levels (i.e. above the toe of the existing bluff elevation), excavated from the beach to place the geotubes, or utilized to level the area for the coastal engineering structure placement. As discussed during numerous hearings regarding 'hard armoring' along the Sconset Bluff, it is critical that mitigation be performed in a proactive manner to ensure stability of adjacent bluffs. Reactive mitigation will not maintain bluff stability, since failure of adjacent bluff shorelines cannot be reconstructed through sand mitigation.

Mitigation

Similar to the past two SBPF armoring applications, the Town of Nantucket project would cause a complete loss of the sediment supply along the armored section; however, the proposed beach nourishment volume computed to mitigate for this loss is not based on the best available information (e.g. long-term data compiled by both MCZM and SBPF consultants over more than 20 years). A thorough analysis of appropriate mitigation quantities should be based upon **all** available information and not focused on time periods that are strictly beneficial to the applicant, at the expense of downdrift property owners. The specific comments below address the shortcomings

and/or incorrect analysis contained in the updated coastal bank retreat calculations provided by Epsilon Associates:

- The information contained in Table 1 implies that past SBPF calculations regarding the loss of sediment supply caused by armoring of the Sconset Bluff have generally been consistent with the Town of Nantucket proposal presently under review. However, it should be made clear that the gabion project was denied by the Conservation Commission. During the numerous public hearings it became clear that inadequate mitigation and likely adverse impacts to downdrift properties remained concerns for a majority of the Commission. Specifically for the gabion project, Epsilon Associates, Inc. calculated the appropriate mitigation volume to be 19.1 to 19.5 CY/lf/year (these values excluded 13% of the total volume eroding from the bank due to fines, with the inclusion of fines the erosion rate is 20.8 to 22.2 CY/lf/year). In their presentation, there was never any mention that this calculation included any "overfill allowance" or extra material, as erroneously claimed in Epsilon's November 1, 2013 memorandum. Therefore, the computed mitigation requirement for this previous project proposed by Epsilon Associates was more than 33% larger than the mitigation currently proposed, and more accurately more than 50% more than currently proposed.

- While the November 1, 2013 Epsilon review is extremely critical of the long-term MCZM shoreline change analysis and the "purpose" of the CP&E sediment budget, neither criticism appears based upon sound scientific or engineering principles.
  - The primary criticism of the MCZM analysis is focused upon the claim that SBPF monitoring data "has consistently shown that shoreline erosion rates in areas where coastal banks are fronted by dunes are ***significantly higher*** than shoreline [change] rates in areas with an eroding coastal bank." There is no quantitative analysis provided to support this conclusion and data from the monitoring certainly demonstrates that many dune areas (e.g. Codfish Park) have experienced significantly less shoreline retreat than the area along the Sconset Bluff.
  - According to Epsilon Associates, MCZM shorelines indicate shoreline change rates within the project area are between 4.0 and 9.7 feet per year, which would indicate that the proposed "bluff crest" erosion rate of 4.6 feet per year is well below the average for this shoreline and not applicable to utilize as a rate for mitigation calculations. This is further supported by the Ocean and Coastal Consults, Inc. (SBPF engineering consultant) analysis that indicated a shoreline erosion rate of ~8 feet per year or about 20.7 CY/lf/year (from the September 2010 Siasconset Coastal Bank Stabilization and Beach Preservation Project Alternatives Analysis submittal on behalf of SBPF to Nantucket Conservation Commission).
  - Epsilon also indicates that the MCZM analysis "is subject to uncertainty"; however, they never describe or attempt to quantify the uncertainty of their own analysis. Based on sound scientific principles, the MCZM analysis typically has an uncertainty on the order of ±0.4 feet per year (an order of magnitude below the observed shoreline recession rate). The Epsilon analysis also has inherent uncertainties and based on utilizing "top of bank" as their baseline, these uncertainties are magnified due to interpretation problems associated with aerial photography (as well as all of the other uncertainties related to the typical MCZM shoreline change analysis). As presented, the 1994 top of bank was delineated from an aerial photograph – an analysis technique that is scientifically invalid for

determining coastal change. As stated during many previous Conservation Commission meetings regarding other similar SBPF filings, a lower rate of bluff erosion relative to shoreline erosion is not possible, as this initially causes an over-steepening of the coastal bank and eventually leads to the crest of the coastal bank being seaward of the beach, which of course is not possible.

- Figure 1 provided in the Epsilon memorandum provides some of the best evidence of how use of "coastal bank crest" data misrepresents ongoing processes and appropriate shoreline change rates. Specifically, a cursory review of the figure indicates that erosion rates for Lots 91-107A between 1994 and 2003 were relatively modest over this 9-year period, but certainly accelerated over the 2003-2013 time period. However, Epsilon chose to utilize the 1994-2013 time period which clearly yields a lower erosion rate that is not representative. Other data (e.g, the Woods Hole Group, Inc. surveys of bluff position) demonstrate a recent steepening of the coastal bank in the project area, which is clearly evident and likely the reason for the Town's involvement and desire to stabilize the bluff. However, the analysis of the bluff crest by Epsilon does not incorporate this ongoing over-steepening followed by episodic collapse mechanism in the analysis. The episodic nature of the bluff failure mechanism is the primary reason why coastal scientists/engineers do not use the coastal bank crest position as a valid proxy for shoreline retreat rates. The subjective data analysis provided by Epsilon does not provide confidence that the conclusions are robust and conservative relative to Town of Nantucket concerns for neighboring and downdrift properties.
- Criticisms of the 2006 CP&E sediment budget (another consultant report produced for SBPF) are completely unfounded, as this effort represents the only significant effort by SBPF to use 'best available measures' to quantify sediment transport along the Sconset Bluff region. The methodology is identical to the type of analysis presented by Epsilon; however, it also is informed by coastal processes data and modeling. This analysis indicated the bluff/beach system in the project region provides approximately 24.2 CY/lf/year from the sediment budget developed for the period from 1995 to 2005.
- Due to the inter-annual variability in shoreline change rates within the project area, it is clear that the substantial accretion observed in 2013 is not typical for this region. In situations similar to this, coastal scientists/engineers typically employ a least-squares fit to **all** of the long-term shoreline change data to determine shoreline change. The method currently presented by Epsilon and incorporated into the Town application is misleading and underestimates the actual impact to downdrift beaches that will be caused by this project. Available shoreline positions for every Quarterly Survey should be provided as the basis for this analysis. Use of bluff crest position data should be discontinued, as it is misleading and is not considered sound scientific practice.
- Epsilon has never incorporated any of the sediment placement by SBPF (i.e. bank and beach material) into the bank erosion computations. This leads to an additional (although likely small) underestimation of coastal bank and/or beach erosion rates.

- As mentioned in previous meetings, the 2013 shoreline position is aberrant relative to recent historic trends dating back to the inception of SBPF (circa 1994). For example, the Woods Hole Group, Inc. survey data indicates that the 2013 shoreline in the project area has accreted since 2011. If this were the long-term trend, there certainly would be no need

for the project, since natural forces would be re-building the beach. Of course, this is not truly the case and this one-time accretion should be viewed as an outlier and the data associated with this time period should not be utilized without a thorough review of historical trends from **all** time periods monitored. This point is highlighted by the following quote from the most recent Woods Hole Group monitoring report:

> *In the project area the shoreline along all profiles, except 89.2, advanced likely due to a portion of sediment eroded from the bluffs remaining on the beach*

Therefore, utilization of the 2013 shoreline position for mitigation calculations is misleading and incorrect. Instead, SBPF and the Town should provide the data and a more complete analysis (as described above) to develop an accurate long-term shoreline trend should be utilized as the basis for the *minimum* amount of mitigation nourishment required.

- According to the plans, as well as the presentation at the last Conservation Commission meeting, the project design team has opted for placing the proposed armoring seaward of the coastal bank. Based on the design, it appears that the proposed structure will extend approximately ±40 feet onto the beach. Therefore, the Town should also consider mitigation for the loss of sediment supply associated with the beach, since the proposed structure is effectively preventing a substantial portion of the beach sediments from remaining a part of the active littoral system.
- Based on the project plans, the properties likely to suffer increased erosion at the north and south ends of the geotube structure are Lots 109, 113, 115 (to the north), and 83 (to the south). The impacts of the structure on properties immediately adjacent to the shore protection structure will experience increased erosion as a result of wave energy focusing and exacerbated wave reflection. This increase on local erosion rates is often referred to as coastal structure "end effects". A stand-alone mitigation strategy to *proactively* address these "end effects" should also become part of the Town's overall mitigation strategy. Similar to the mitigation for the overall bank erosion, the volume of material should be placed annually, regardless of monitoring results. The volume of sediment associated with the "end effects" should not be considered part of the overall mitigation volume related to typical bank erosion, as the "end effects" represent a local acceleration in erosion rates directly caused by the structure.
- Numerous discussions of shoreline and/or coastal bank monitoring have been debated for nearly 20 years at Sconset. Certainly, closely spaced transects should be considered directly adjacent to the proposed structure to ensure that the "end effects" are effectively monitored. As mentioned above, there is a significant concern that near-term end effects could immediately jeapordize the structures to the immediate north and south of the project. According to the July 2013 coastal armoring NOI submitted by SBPF, dwellings on Lots 109 and 113 are within 13 and 18 feet of the coastal bank crest, respectively.

Temporary Structure Alternatives

At the October 30, 2013 Conservation Commission hearing there was a discussion about reexamination of design alternatives to ensure the least impactive solution was brought forward for the temporary protection of Baxter Road to allow the Town time to secure alternative means of access. Reviewing the additional information submitted by Milone & MacBroom on November 1, 2013, it does not appear any serious consideration was given to alternative designs that could minimize impacts to adjacent properties. As we have pointed out previously, Geotube Alternative 1 – Jute Fiber Logs have been shown to work over a number of years at 79 Baxter Road. The Jute Fiber Logs approach does require regular maintenance, however that is a direct

result of the way the system was designed to function. The Jute Fiber Logs were designed to release sediment to the nearshore system thereby causing minimal adverse impacts to the ability of the coastal bank to act as a sediment source for downdrift portions of the shoreline. Epsilon Associates, Inc. characterizes the jute design as follows in a June 13, 2008 letter to Conservation Commission in support of an extension request for the Jute system;

> *when a portion of the jute bag is ruptured by wave action resulting in a rapid contribution of the contained sediment. Both of these mechanisms of sediment contribution have often been mischaracterized as a "failure" of the terraces. This is an inappropriate characterization since the terraces were specifically designed by the proponent and subsequently conditioned by the Commission to contribute sediment to the nearshore system by these two mechanisms while minimizing project related debris in the nearshore system. Therefore sediment release to the nearshore system during storm events is in fact a successful result of the terrace design.*

Over the winter of 2012/13 the Jute Fiber Logs were damaged by storms and 30 feet of bank at the north end of the 79 Baxter Road was eroded. Examining aerial photographs suggests that offsets along bank face resulted in focusing of wave energy at the ends of the Jute Fiber Logs. The localized increase in wave energy resulted in end effect scour and bank erosion on neighboring properties which led to the system being flanked. Flanking and end effect scour are the outcome of a structure not been properly designed and then mitigated for. In past hearings Epsilon has indicated that the volume of mitigation associated with the jute project were on the order of the volumes currently being proposed and thus low mitigation volumes are likely a key factor in the damage at the north end of the project. The erosion of the bank illustrates how critical mitigation volumes are to ensure the success of a project. For any project along the Sconset Bluff to succeed, it is critical that nourishment volumes be carefully considered and appropriate volumes be placed on the beach; otherwise the structure will fail and in the interim, the structure will result in significant impacts to downdrift properties. The Town of Nantucket should not be protecting Baxter Road at the detriment of neighboring property owners whom the Town's project is seeking to help by preserving Baxter Road.

During the October 30th hearing the commission members also requested additional information about hybrid geotextile/jute designs, cases where similar systems have failed and cases where similar system have succeeded. That information was not provided at the November 6th meeting, but rather the Town DPW indicated that they do not believe a jute system would work due to the level of design risk. However, no information regarding some type of hybrid alternatives that would be more appropriate for short-term bank protection have been provided and we suggest that the Town be asked to re-visit the alternatives analysis.

Geotube Design Considerations

It is clear that scour represent a critical concern in the design of the proposed structure. Scour in front of the structure is directly tied to the incident wave energy, wave reflection, and volume of sediment available within the littoral system to keep the structure outside of the active surf zone. It has been mentioned that the proposed system was optimized to minimize seaward encroachment onto the beach. However, a quick look at the reflection coefficients for a structure of this type reveal that wave reflection off the structure is going to be significant. Using the effective structure slope, the reflected waves range from 70- to 90-percent of the incident wave height, on a micro scale of each geotube lift, the reflected waves approach 100-percent of the incident wave height. It is clear that the design of this structure is going to result in the lowering of the beach height and reduction in beach width in front of the structure, which will allow larger waves to impact

the structure over future storms. The details of the design need to be reconsidered to minimize impacts to the coastal system while providing the necessary protection to Baxter Road.

There does not appear to be any design features with the proposed geotube design to address and minimize end effect scour on neighboring properties. Immediately to the north and south of the proposed project, the homes at 109, 113, and 115 Baxter Road are within 11 feet, 13 feet, and 18 feet of the end of the coastal bank at the end of the proposed geotube structure (Table 1 from the SBPF July 2013 NOI). The proposed geotube design and mitigation plan has not alleviated or even minimized the potential impacts to these dwellings. If the proposed structure is constructed, it will cut off the natural supply of bank and beach sediment from the littoral system, starving the shoreline immediately north of and south of the structure resulting in an acceleration of ongoing erosion. In addition the end of the structure will focus wave energy on the adjacent coastal bank further accelerating the erosion along the adjoining properties. The project as proposed is directly jeopardizing the adjoining properties and dwellings.

We remain concerned with the Town of Nantucket attempting to permit and construct a coastal structure that will result in significant wave reflection due to the vertical and hard nature of the geotextile tubes, a structure that will cut of the natural supply of sediment from the littoral system in coastal environment where the shoreline is retreating in excess of 5 feet per year, and a proposed mitigation plan that is not sufficient to offset the adverse project impacts.

Sediment Contributions

As we have previously stated, the proposed geotubes structure is designed to act in a similar manner to a revetment by isolating the coastal bank and beach from erosive forces. By cutting off the supply of material from the coastal bank to the littoral system the project will shift and magnify erosion onto adjacent Town owned beach and neighboring properties along the coastal bank which already face significant erosional concerns. The Town of Nantucket should not put any properties at greater risk due inadequacies in the mitigation planning and analysis.

The following table illustrates the current volumes of sand proposed as part of the geotube project:

Placement Location	Rate of Placement (CY/LF)	Length of Placement (Feet)	Total Volume (CY)
Inside Geotubes	4.22 (each tube)	1,500	25,320
Leveling Sand	2.3	1,500	3,450
Nourishment Sand	14.3	1,500	21,450
		TOTAL VOLUME	50,220

*Reproduced from MMI's October 25, 2013 letter to the Conservation Commission

- The first and largest volume listed within the table is the 25,320 CY of sediment contained within the geotubes. The sediment within the geotubes should not be considered mitigation nourishment, since the sediment is isolated from the littoral system within the geotubes and provides no mitigation value to the shorelines updrift and downdrift of the proposed structure.
- The leveling sand should not be considered mitigation nourishment; the sediment is isolated from the littoral system behind the geotubes and the geo-textile scour apron.
- The 18 CY/lf (27,000 CY) of excavated beach material associated with the placement of the fourth geotube below the existing beach face is currently available to downdrift beaches within the littoral system should erosion occur, if the displaced beach

material is utilized for leveling of bank, sand cover, and/or mitigation nourishment it represents a loss of available beach material from the littoral system and hence should be appropriately mitigated for with additional beach nourishment.

- The geotextile selected for the structure requires a two foot cover of sand over the entire structure to prevent UV damage. The two foot sand cover has been characterized as a portion of the annual mitigation by Milone & MacBroom. The placement of mitigation nourishment over the top of the geotubes up to an elevation of +28 feet (16 feet above the 100-Year base flood elevation) places a significant volume of the mitigation outside of the active littoral zone, thereby reducing the effectiveness of the mitigation to moderate the downdrift impacts. If sand cover is required to prevent UV damage over the 3 to 5 year design life of the structure, then the additional volume of sediment required should be provided for independently of the mitigation. Therefore, sand placed on the geotube structure should not be considered mitigation.

It is clear that the current volumes of sediment associated with the proposed structure (see table above) should not be consider as part of the annual mitigation nourishment for the structure. Mitigation should be addressed separately.

Conclusions

Reviewing the narrative presented within the NOI for the 2013 Baxter Road Temporary Stabilization Application, as well as the follow-up documentation provided by Milone & MacBroom (letter signed by Nicolle Burnham, P.E. dated November 1, 2013 with attachments), illustrates that regardless of the stated temporary and minimal nature of the proposed project, the proposed geotube structure will cut off the supply of material from the coastal bank to the littoral system. Failure to adequately mitigate for the project will shift and magnify erosion onto adjacent Town owned beach and neighboring properties along the coastal bank. Some of these adjacent properties are within 20 feet of the bank crest. Analysis provided by SBPF consultants indicates that the minimum annual mitigation nourishment should be on the order of 22 CY/lf/year or approximately 33,000 CY per year. This value is consistent with MCZM shoreline change data for the project region. The updated analysis provided by Epsilon Associates is technically flawed and should not be utilized by the Town as the basis for computing mitigation volumes. The *minimum* mitigation volume should provide for one-to-one mitigation of the material that is currently being provided from the coastal bank to the littoral system. It is important to note that the one-to-one mitigation does not account for any additional erosion which is likely to occur due to end effects, wave reflection, and disturbance of the coastal bank and beach during construction. The goal of mitigation is not to prevent erosion in front of the proposed structure, but to prevent the acceleration of erosion on adjacent shorelines.

In addition to mitigation concerns, additional analysis of alternatives has not been provided, monitoring details remain unclear, the failure criteria presented is nonspecific and not quantitative, additionally the details regarding construction protocols also remain unclear.

EXHIBIT
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November 4, 2013

Earnest Steinauer, Chairman, and
Nantucket Conservation Commission
2 Bathing Beach Road
Nantucket, MA 02554

RE: Comments on Nantucket DPW& SBPA Inc's Proposed 'Stabilization of Roadway & Utilities in the Public Layout of Baxter Road' Notice of Intent and Accompanying Material

Dear Conservation Commissioners:

On behalf of the Quidnet Squam Association, Inc., I am submitting the following comments on the proposed '*Stabilization of Roadway & Utilities in the Public Layout of Baxter Road'* as described in the October 13, 2013 Notice of Intent (NOI) submitted by the Nantucket DPW & Siasconset Beach Preservation Fund, Inc. to the Conservation Commission.

Also reviewed were the October 25, 2013 'Baxter Road Temporary Stabilization Application' report, the October 1, 2013 'Attachment A: Baxter Road Stabilization Alternatives Analysis' prepared by Milone & MacBroom on behalf of the applicants, and other comments and additional information uploaded on the Town's web site November 1, 2013.

Quidnet Squam Association
The Quidnet Squam Association is an Association of properties owners most of whom own properties on or close to the beaches and dunes along the eastern shore of Nantucket north of the proposed project area. Because the Association member's properties are *downdrift* of the proposed project, they are concerned about possible adverse impacts to their beaches, dunes, barrier beach and developed properties in the form of potential project-related accelerated erosion and storm damage.

Although the NOI and accompanying information do not provide any coastal processes or erosion rate information for the reach of shoreline or coastal bank that is the subject of this NOI filing, based on many available technical documents and information gleamed from prior filings with the Conservation Commission, it is obvious that sediment eroding from the Sconset coastal bank (including the area of coastal bank that is the subject of this NOI) is a significant sediment source contributing to the healthy volume of beaches, dunes, and barrier beaches to the north of the Sconset Bluff, including the Quidnet Squam beaches and dunes and the barrier beach fronting Sesachacha Pond.

Selected information from several technical reports is included later in this report that documents that the Sconset coastal bank is significant sediment source to the downdrift Quidnet Squam shoreline areas to the north. Of particular note is the Coastal Planning and Engineering's (CP&E) information provided to the SBPF in their 2006 Report, Section 8, Table 10 and Figure 8 which clearly shows a significantly larger volume of sediment being transported to the north from the coastal bank, beach and nearshore areas in the project area.

Proposed Project: Preferred Alternative

The proposed project spans across multiple contiguous privately owned properties from #85 to #107A Baxter Road, as well as proposed to be constructed on the Town-owned coastal beach fronting the coastal bank. As stated, the goal of project is to maintain vehicular access and utility service to the residential properties on Baxter Road from Bayberry Lane to the Sankaty Head Lighthouse property. It is stated that work is limited to those areas where Baxter Road appears to be in imminent danger of failure from bank erosion, i.e. where the top of the coastal bank is 30-40 feet from Baxter Road in some areas and 60-70 feet in other areas.

The preferred alternative is shown on the accompanying Plans and described in the October 25, 2013 Milone & MacBroom 'Baxter Road Temporary Stabilization Application' as temporary coastal bank toe protection along 1,500 linear feet of coastal bank extending from #85 to #107A Baxter Road by the placement of four 45-foot circumference geotubes, including a scour apron and a 4 foot diameter anchor tube. The geotubes will overlap creating a 2:1 slope with the top geotube at the FEMA-mapped 100-year flood elevation of 26'MLW. The geotube revetment will encroach onto the fronting coastal beach approximately 40' and an additional 5' for the scour apron and anchor tube, thus displacing approximately 69,900 square feet of coastal beach. This design will cover approximately half of the fronting coastal beach.

A sacrificial 2' minimum sand layer will cover the top geotube to elevation 28' MLW with the sacrificial sand layer covering the seaward face of the tubes at a 2.5:1 slope.

The applicant's propose an approximate 14.3 cubic yards of sand cover per liner foot of geotube for the 1,500 linear feet of geotubes (21,450cy). This sacrificial sand cover is proposed to protect the geotubes and mitigate for the loss of the coastal bank as a sediment source.

Winter sand replenishment is proposed to occur at a rate of one cubic yard per linear foot when 50% of the height of the bottom tube is exposed. Each spring (before April 30) the two feet of sand cover will be re-established over the geotubes.

Jute netting is proposed on the coastal bank above the geotubes, with planting of the coastal bank to occur in the spring. A low berm is proposed along the roadway edge to prevent runoff that is presently causing rill erosion down the coastal bank.

The project is stated to be 'temporary' with a suggested design life of 5 years, with maintenance when necessary, and according to the NOI is intended to provide a minimum but adequate level of protection for the short-term while long-term solutions are explored and implemented.

In terms of monitoring and maintenance requirements, it is stated for example, that repair of torn geotextile will be completed as soon as the beach is accessible, and sand replenishment will be completed as soon as appropriate based on weather conditions and time of year.

Eastern Shore of Nantucket is an Interactive System: A Littoral Cell

Based on many available technical documents (cited in previous filings to the Conservation Commission), the coastal bank which is the subject of this filing is a major sediment/sand source contributing to the healthy volume of beaches, dunes, and barrier beaches along the Quidnet Squam shoreline areas to the north. Sediment is also cited to be transported at times towards the south; however, as cited above according to CP&E a significantly larger volume of sediment is transported north.

Thus, the eastern shore of Nantucket can be considered a 'littoral cell'. As such, the coastal banks, coastal beach, coastal dunes, barrier beaches and near-shore areas are an interactive system: Any interruption in the *volume and timing* of the sediment supply from the coastal bank to the areas to the north can potentially result in adverse impacts in terms of accelerated erosion and storm damage to the beaches, dunes, and barrier beach, and as a result possible damage to landward developed property.

Potential Impacts to Downdrift Resources and Property

Additional Transects Request

One of the 'failure criteria' stated in the filing information is 'excessive change in the updrift or downdrift beach cross section(s)'. However, importantly, the failure criterion goes on to state that *'quantitative failure for updrift and downdrift impacts is difficult to develop with certainty at this time'* (emphasis added). The criteria go on to state that, 'if annual transects suggest changes are occurring as compared to historic data collected by SBPF over the past 15+ years, the DPW will meet with the Conservation Commission staff to determine if they believe the changes are a result of the project, and an appropriate course of action will be determined'.

The applicants offer, 'if the Commission would like to have updrift and downdrift impacts monitored, the Town would be amenable to modifying the monitoring plan to include:

- Year 1 transect surveys in locations previously performed by the Woods Hole Group (WHG) in April and August; and,
- Years 2-5 transect surveys in locations previously performed by the WHG in April.

That the transect surveys continue is an absolute necessity: along with visual observations, transect surveys are a vital and necessary component of determining if adverse impacts are occurring to downdrift areas. We appreciate the Milone & MacBroom November 1, 2013 memo stating that transect surveying will continue and that a thorough analysis and interpretation of the data collected during the life of the project will be competed.

However, at present, and since the inception of the monitoring project in 1994, only 1 transect is monitored in the Quidnet area and 1 transect in the Squam area. Two transects along this shoreline area are clearly not sufficient to determine if adverse impacts are occurring to the Quidnet Squam areas.

1. Thus, the Quidnet Squam Association requests that Commission require not only that the *Southeast Nantucket Beach Monitoring Project* analyses by the Woods Hole Group (or other competent surveying group) continue to monitor the 44 existing beach profiles, but that several **additional survey profile locations be added along the Quidnet Squam areas, and that these additional transects and all other transects be surveyed not only in April and August, but prior to and immediately following artificial nourishment and pre- and post-coastal storms.**

These additional transects in the Quidnet Squam areas should extend from the nearshore area to the landward toe of the landwardmost coastal dune. Only with complete transects surveyed seasonally (following winter: April; and, following summer: August) and prior to and following coastal storms (Northeast storms and hurricanes) will sufficient data be available to attempt to quantify and make a determination if adverse impacts are occurring to downdrift coastal resources and developed property from the project.

2. **In addition, the Association is requesting that the Commission require a description of how the applicant's technical consultants will distinguish between far-field adverse impacts from the geotube revetment project and natural storm-induced erosion and storm damage north of the project area, particularly along the Quidnet Squam shoreline areas.**

Furthermore, a thorough data analysis and conclusions from each transect monitoring episode should be conducted by the Woods Hole Group as they occur in order to understand the evolution of the project and adjacent shorelines. An annual report will also be forthcoming.

Sand Nourishment Requirement

It is stated that 'winter replenishment will occur at a rate of one cubic yard per linear foot when 50% of the height of the bottom tube is exposed. Each spring the two feet of sand cover will be re-established over the geotubes.'

The volume and timing of sand proposed in the 'sand nourishment criteria' is simply not adequate to prevent and ensure downdrift adverse impacts will not occur as a result of the project.

The initially placed 14.3 cubic yards of sand per linear foot will be deposited *seaward* of the coastal bank over the geotubes, basically on the coastal beach and/or where the coastal beach would be absent the geotubes. The geotubes and sand nourishment displace approximately half of the summer beach area. The winter beach profile will be even narrower.

In this more seaward location the sand nourishment can be anticipated to erode faster during storm conditions than if the sediment were being eroded from the more landward semi-compacted coastal bank. In natural erosive action, the toe of the coastal bank would erode providing source sediment to the fronting beach; shortly thereafter – oftentimes **during** a moderate to major coastal storm and during each subsequent storm high tide storm cycle – the

upper portions of the coastal bank would slump providing additional natural sediment nourishment to the fronting beach that will subsequently be transported to adjacent and downdrift beaches. During northeast storms this naturally eroded source sediment is introduced **continuously** over several tidal cycles.

The proposed winter replenishment of 1 cubic yard per linear foot when 50% of the height of the bottom tube is exposed is not adequate to provide a continuous stream of source sediment to downdrift beaches, dunes and barrier beaches *during* a coastal storm; thus, the project will not prevent or minimize adverse downdrift impacts during a coastal storm.

This adaptive approach of adding winter replenishment of 1 cubic foot of sand suggests that the 14.3cy/linear foot of sand cover is anticipated to be eroded due to storm action.

One cubic yard per linear foot will more than likely completely erode early during storm conditions, leaving no further sand volume available to be transported downdrift – *during* a coastal storm - which is precisely when the littoral system requires the sand to reduce storm wave energy and prevent or reduce storm damage to downdrift areas.

This more than likely will result in a wave of erosion or 'hot spot' of erosion and/or storm damage moving alongshore downdrift. If a 'hot-spot' or erosion wave is moving downdrift, replacing sand over the geotubes 'as soon as appropriate based on weather conditions' and placing only 1 cubic yard per linear foot will not prevent subsequent erosion or storm damage as a result of an erosion wave.

Furthermore, the volume of sand nourishment remains a concern in that it may be lower than the volume that would erode during an excessively active coastal storm season. The proposed sand mitigation volume is an 'average' – which is generally acceptable; however, in this exceptionally high energy area, the sand mitigation volume may be too low to accommodate an above average coastal storm season. If additional sand volumes are not available 'during' a coastal storm, downdrift adverse impacts will more than likely occur.

In addition, the 18cy/lf of sand that will be removed from the beach to accommodate the placement of the bottom geotube, scour pad and anchor tube should be added to the 14.3cy/lf of sand cover or added during the winter or following storms. This 18cy/lf although being used in the placement of the geotubes is lost to the system in that it will be used as part of the geotube leveling pad. Only if the geotubes fail will the 18cy/lf be made available to the littoral system.

Thus, the concern of the Quidnet Squam Association is possible adverse impacts if the proposed 'sand mitigation plan' does not perform as anticipated by the applicant's consultants. While we appreciate the proposed sand mitigation plan, *the placement of off-site mitigation sand seaward of the coastal bank and particularly the timing of sediment delivery to the north cannot mimic natural processes,* and could result in adverse impacts to downdrift properties.

3. **Thus, the Quidnet Squam Association is requesting a 'beach and dune sand mitigation plan' for their shoreline area to immediately be able to address the event that adverse impacts are noted along their section of the Nantucket eastern shore.**

   This is somewhat similar to the fallback mitigation proposal of adding more sand to the ends of the geotube revetment if significant end scour occurs despite the initial additional sand proposed to be placed at the geotube revetment ends to attempt to mitigate end scour. The possibility of adding more geotubes at the flanking ends is also proposed.

   The logistics (e.g. reserve sand stock piling) and commitment of providing sand mitigation along the Quidnet Squam shoreline and dune areas, if and when necessary, must be clearly outlined and deemed doable by the Commission and involved project specialists. As part of this *extended sand mitigation plan*, sand placement should not only be addressed in the project and immediately adjacent areas due to possible flanking, but also along the Quidnet Squam beach and dune areas in the event project-related erosion and storm damage are noted.

Regulatory Compliance: Nantucket and State Wetlands Protection Regulations

Proposed Project Description

The proposed project is, in part, to construct a 1,500 linear foot 'temporary' coastal engineering structure, i.e. geotube revetment, on a sediment source coastal bank extending onto the fronting coastal beach, including mitigating sand cover, to protect a roadway and utilities from storm induced erosion.

The initial application proposed two distinct sections of tubes only at locations where roadway failure appears imminent and where no structures currently exist. However, as stated, in the NOI, the issue of 'flanking' cannot be resolved in the gap area between the 2 systems; therefore, a continuous run of geotubes from #85 to #107a Baxter Road is now proposed. Thus, the proposal now includes areas of the roadway that are and are not presently threatened from erosion.

Coastal Banks and Coastal Beach: Regulatory Compliance

The project proposes to armor a sediment source coastal bank. *Coastal banks* are defined, in part, as 'the seaward face or side of any elevated landform, other than coastal dune, which lies at the landward edge of a coastal beach, coastal dune, land subject to tidal action or coastal storm flowage, or other coastal wetland' in the Nantucket and MA Wetlands Regulations @ PART I, s. 1.02 DEFINITIONS and S. 10.30(2), respectively.

The Nantucket Wetlands Regulations @ Part 2: s. 2.05(B)(1) states, in part, 'No new bulkheads, coastal revetments, groins, or other coastal engineering structures shall be permitted to protect structures constructed, or substantially improved, after 8/78 except for *public infrastructures'* (emphasis added).' The Nantucket regulations go on to state, 'other coastal engineering structures may be permitted only upon a clear showing that no other alternative exists to protect a structure that has not been substantially improved or public infrastructure built prior to 9/78, from imminent danger.'

However, the MA Wetlands Protection Regulations @ 310 (CMR) 10.30(3) allow armoring a sediment source coastal bank to protect only '*buildings*' (emphasis added) constructed prior to August 10, 1978.

Thus, it appears that armoring a coastal bank to protect public infrastructure in imminent danger of loss due to erosion, e.g. a public roadway and utilities, may be permitted under the Nantucket Wetlands Regulations. However, there appear to be other regulatory compliance issues. As stated in the November 1, 2013 Milone & MacBroom memo, 'information regarding waiver requirements and regulatory compliance will be submitted under a separate cover form the town's attorney'. We await this submittal and will respond accordingly when it is made available.

Importantly, under the MA state Wetlands Protection Regulations armoring a sediment source coastal bank is allowed only to protect a *building* (emphasis added) constructed prior to August 10, 1978, not a roadway or utilities.

Limited Project Status

In Section A, 7(b) of the NOI and the Milone & MacBroom report (p. 2) the project is stated to be considered as a '*limited project*' pursuant to 310 CMR 10.24(c)(2) and, thus, may be considered for issuance of an Order of Conditions despite the state performance standards for sediment source coastal banks which allows consideration of a revetment only to protect a 'building' constructed prior to August 10, 1978. The project is proposed to protect a roadway and infrastructure, not a building. In fact, the proposed project would armor the coastal bank to temporarily protect 7 vacant lots and 3 lots with buildings (i.e. so-called 'gap lots').

How the project fits within the designation of a 'Limited Project' as checked in the Notice of Intent filing @ Section A, General Information; 7(b), and stated in the Milone & MacBroom report is unclear. The proposed project is a temporary (5-year life expectancy as stated in the NOI) coastal engineering structure that is proposed to armor an eroding coastal bank that is a highly significant sediment source to downdrift beaches, dunes and barrier beaches in order to temporarily protect a roadway and utilities from erosion and storm damage.

It appears that the proposed project may not meet the criteria for a 'limited project': it is not, as stated in the section of the Regulations cited in the NOI and Milone & MacBroom report, 'maintenance, repair and improvement (but not substantial enlargement) of structures, including buildings, piers, towers, headwalls, bridges and culverts which existed on November 1, 1987'. This provision specifically does not name 'roadways' as part of structures: the previous section @ 10.24(c)(1) addresses maintenance and improvement of existing 'roadways', but (is) limited to widening less than a single lane, adding shoulders, correcting substandard intersections or improving drainage systems'. It does not appear to meet either of these performance standards.

It is also interesting to note that the Nantucket regulations distinguish between a 'structure' and 'public infrastructure' (coastal bank section, Part 2: s. 2.05(B)(1)).

Thus, approval under an NOI filing under the state Wetlands Protection Regulations may not be appropriate, and a *'variance'* from the state Wetlands Protection Regulations issued only by the DEP Commissioner may be required. A written legal opinion from the DEP may be appropriate before the Conservation Commission proceeds any further in the review of the proposed project to ensure legal compliance.

Alternatives

The Nantucket Wetlands Regulations @ Part 2: s. 2.05(B)(1) states, in part, 'No new bulkheads, coastal revetments, groins, or other coastal engineering structures shall be permitted to protect structures constructed, or substantially improved, after 8/78 except for *public infrastructures*', and continue to state 'other coastal engineering structures may be permitted only upon a clear showing that no other alternative exists to protect a structure that has not been substantially improved or public infrastructure built prior to 9/78, from imminent danger.'

While the geotubes *may* have a longer life expectancy, they have a greater potential adverse impact to beaches and dunes than biodegradable alternatives, e.g. coir and jute. While we appreciate the intent of having more time to develop long-term alternatives, the use of coir (or jute) that has shown to be successful in the short-term along the eastern shore of Nantucket will expedite the long-term alternative planning process, as these materials will more than likely not last as long as geotextiles. Geotextiles are also known to have a higher wave reflection factor than porous biodegradable material. Thus, although the applicants reduced wave reflection as much as possible by reducing the geotube revetment slope, fronting beach erosion may be higher with geotextiles, such as geotubes, than porous biodegradable material.

While we suggest that the geotubes may have a higher adverse impact, the biodegradable alternatives do not necessarily leak a sufficient volume of internal sand to prevent a deficit of source sand to downdrift areas, when the sand cover has eroded away – which we anticipate will occur. Thus, this highlights the importance of introducing a continuous sufficient volume of sand to the littoral system while considering the importance of the timing of the release of sand - during a storm – to prevent downdrift adverse impacts.

Coastal Processes, Shoreline Change and Sediment Transport along Nantucket's Eastern Shore: Documented Justification for Additional Far-Field Monitoring and Mitigation

Based on many available technical documents, it is obvious that sediment eroding from the Sconset coastal bank is feeding and contributing to the healthy volume of beaches, dunes, and barrier beaches to the north of the Sconset Bluff, including the Quidnet Squam beaches and dunes.

For example, based on the Woods Hole Group's 'SE Nantucket Beach Monitoring', 60th Survey Report conducted during March 2013 and analyses published August 2013, it was documented, in part, that between November 1994 and December 2002 that the northern transects (86 through W – including the Quidnet Squam areas) for the most part revealed accretion, while the central Sconset bluff area eroded. In addition, from December 2001 through Sept 2012 the northern transects for the most part again accreted while the central Sconset bluff area eroded.

This analysis clearly suggests that a sediment transport relationship exists between the eroding Sconset bluff area and the Quidnet Squam shoreline areas. This sand source relationship is also documented in several technical reports as outlined below.

'Net alongshore current movement and littoral transport of sand are primarily driven by tidal currents and run from *south to north* (emphasis added) along Nantucket's eastern shore (Gutman, et al., 1979 in Tiffney and Andrews, 1990). Evidence for northerly flow and movement is provided by the existence of the six-mile-long tombolo and sand spit complex of Great Point, formed of wave and current deposited sediments, and found at the northern and of Nantucket Island. Hence, the net movement of sediments eroded from the Sankaty Bluff is to the north toward Sesachacha Pond....' (Tiffney and Andrews, 1990).

'*The littoral system will naturally transport nourishment material north and south of the project area* (emphasis added). Adjacent shorelines will accrete naturally as a result of the nourishment, with Sesachacha Pond widening approximately 40 feet'. Typically, the magnitude of shoreline change will decrease with increasing distance from the nourishment area. Extensive computer modeling results indicate that sediment transport from the project area will not detrimentally impact wave transformation or current flow'. (DMF 20: Response to DMF Comments on NOI: Attachment to Conservation Commission Meeting #3 Responses, Epsilon Associates, Inc., March 21, 2007).

Furthermore, all authors of historical shoreline changes along Nantucket's eastern shore reference complex interactions among tidal currents, waves, and bathymetry. These complex interactions drive changes and migration in the offshore shoal configuration. These changing shoals configurations in concert with coastal storms change the focus of locations of wave energy along the shore and are the primary driving mechanism for historical erosion and accretion patterns and bluff erosion along the eastern shore.

For example, 'the lack of long-term measurements of the alongshore sediment transport patterns in the project area necessitated the use of computer-hindcasted wave information in the determination of potential longshore transport rates. This analysis provided an estimate of an annual net alongshore sediment transport directed toward the south at a rate of 174,000 cubic yards per year. *The authors note that this analysis is prone to substantial error in both magnitude and direction because of the uncertainties associated with wave transformation across the complex bottom topography (shoals) just offshore the project area which is not accounted for in the computer hindcast employed in the study'* (emphasis added) (Aubrey Consulting, Inc, 1990, Siasconset Beach Nourishment Project cited in the FEIR, Lighthouse Beach Shore Protection and Bank Stabilization Project, Nantucket, MA Feb 25, 2000, by Epsilon Associates, Inc., p. 8-4)

Tiffney, et al., (Coastal Zone 1991) states that 'the unusually high rate of bluff erosion experienced in the vicinity of Sankaty Head lighthouse in the period from 1981 to 1989 appears to be related to storm-induced changes to the offshore shoal configuration.

Epsilon Associates state in their 'Responses to August 28, 2013 Nantucket Conservation Commission Hearing', in part, *'The rate and direction of sediment transport within the project area are highly variable and therefore not predictable. There is evidence of bi-directional longshore sand transport* (emphasis added). Given the dynamic and complex nature of the littoral system at Sconset, any estimate of a detailed sediment budget.....would be subject to enormous uncertainty'. This uncertainty means that there are no reliable or meaningful data available regarding the location to which sediment is transported upon which a reasonable basis for determining an appropriate mitigation program can be developed.

Of particular note is the Coastal Planning and Engineering's (CP&E) information provided to the SBPF in their 2006 Report, Section 8, Table 10 and Figure 8 which clearly shows a significantly larger volume of sediment being transported to the **north** from the coastal bank, beach and nearshore areas in the project area.

That there is a large volume of source sand provided to the downdrift Quidnet Squam shoreline areas as a result of erosion of the Sconset coastal bank is supported by all technical documents reviewed.

Thus, the concern of the Quidnet Squam Association is possible adverse impacts to their beaches and dunes and possibly landward development if the proposed 'sand mitigation plan' does not perform as anticipated by the applicant's consultants. While we appreciate the proposed sand mitigation plan, *the placement of off-site mitigation sand seaward of the coastal bank and particularly the timing of sediment delivery to the north cannot mimic natural processes,* and could result in adverse impacts to downdrift properties.

Summary

In summary, sufficient and clearly outlined information has not been provided to ensure mitigation will take place along the Quidnet Squam areas, if necessary, including:

1. *How* the applicant's technical consultants and the Town's Conservation Commission will distinguish between far-field adverse impacts from the geotube revetment project and natural storm-induced erosion north of the project area, particularly along the Quidnet Squam areas. This evaluation is one of the most important and difficult considerations in the project. An additional outside, unbiased technical analysis will be necessary.
2. if adverse impacts are noted, the timing and process by which the applicants and their technical consultants will document and notify the Commission in writing outlining the type of mitigation that will be provided along the Quidnet Squam shoreline areas, e.g. sand nourishment and vegetation, and how quickly mitigation will be implemented; and,
3. the logistics of providing mitigation in the Quidnet Squam areas, if and when necessary.

Thus, the Quidnet Squam Association requests that the Conservation Commission:

1. **Require not only that the *Southeast Nantucket Beach Monitoring Project* analyses by the Woods Hole Group (or other competent surveying group) continue to monitor the 44 existing beach profiles, but that several additional survey profile locations be added along the Quidnet Squam areas, and that these additional transects and all**

other transects be surveyed not only in April and August, but prior to and immediately following nourishment and pre- and post-coastal storms;

2. **Require a description of how the applicant's technical consultants will distinguish between far-field adverse impacts from the geotube revetment project and natural storm-induced erosion and storm damage north of the project area, particularly along the Quidnet Squam shoreline areas. This evaluation should not be solely between the Town DPW and the Conservation Commission as proposed, but an independent, unbiased technical consultant should be retained to provide an in-depth analysis and recommendation.**

3. **Require that a 'beach and dune sand mitigation plan' for the Quidnet Squam shoreline areas be formulated before any project is permitted in the event that adverse impacts are noted along that section of the Nantucket eastern shore.** The logistics and commitment of providing sand mitigation along the Quidnet Squam shoreline and dune areas, if and when necessary, must be clearly outlined and deemed doable by the Commission and involved project specialists. For example, a sand stock-pile reserve in the Quidnet Squam area for immediate post-storm mitigation if adverse impacts are linked to the armoring of the Sconset coastal bank may be appropriate.

The Quidnet Squam Association appreciates the efforts of the Town and the SBPA and have not as yet taken a position on the *Stabilization of Roadway & Utilities in the Public Layout of Baxter Road'* project. They are, however, significantly concerned about possible adverse impacts to their downdrift beaches, dunes, barrier beach and possibly landward development that could be caused by the interruption of a major source sediment supply, and a proposed 'sand mitigation plan' that does not take the Quidnet Squam shoreline and coastal resources directly into consideration.

The Association needs assurances from the Town and SBPF that adverse impacts to their property will not occur as a result of the project. Although Milone and MacBroom state 'following this adaptive approach, there is no reason to expect adverse impacts to downdrift beaches', there is actually a high likelihood of potential adverse impacts to downdrift beaches and dunes due to the timing of the introduction of the mitigation sand, as described above.

However, if adverse impacts are noted the Association needs assurances that the adverse impacts will be mitigated as soon as possible. These assurances may be in the form of a technical analysis by the applicant's consultants and an independent technical specialist on how to document potential adverse downdrift impacts which will occur if the major sediment supply, volume and frequency of sand introduction to the littoral system, is interrupted. At the present time these assurances do not exist.

We request that the Conservation Commission require a Quidnet Squam area-specific mitigation plan; an explanation of how the applicant's consultant's will distinguish between natural and project-specific downdrift adverse impacts; and, continued and enhanced beach and dune

monitoring. These should be committed to writing as part of this proposal before considering action of the proposal.

On behalf of the Quidnet Squam Association, we appreciate the opportunity to provide these important comments and will continue to work with the Commission, the Town and the SBPA in hopefully arriving at a mutually agreeable approach to meet all ultimate goals while ensuring no adverse impact to downdrift properties and coastal resources.

Yours Truly,

Jim O'Connell, Coastal geologist/Coastal Land-use Specialist
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Cc: Nantucket Quidnet Squam Association, c/o of Richard Peterson, President
Atty Dirk Roggeveen, Nantucket

Partial References

Gutman, A.L., Goetz, M.J., Brown, F.D., Lemowski, J.K., and Tiffeny, Jr., W.N., 1979, Nantucket Shoreline Survey, M.I.T. Sea Grant College Report, MITS 79-7, Cambridge, MA

Tiffney, W.N. and Andrews, C, 1990, 'Sesachacha & Sankaty: Pond Opening and Erosion on Nantucket's Eastern Shore', in Historic Nantucket, V. 38, No. 1, Spring, 1990.

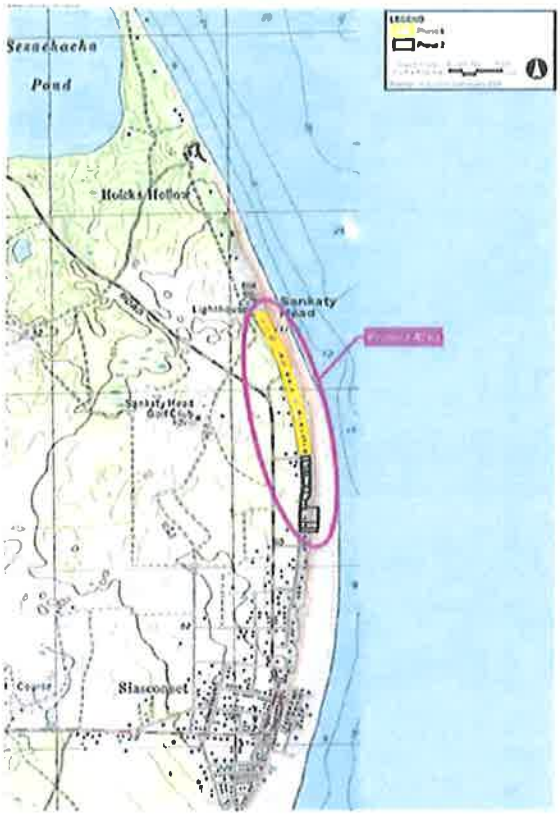
EXHIBIT
6

Rec. @ meeting
by D. Anne Atherton

Notice of Intent

(M.G.L. c. 131, §40) and Town of Nantucket Wetlands Bylaw Chapter 136

BAXTER ROAD AND SCONSET BLUFF STORM DAMAGE PREVENTION PROJECT



Submitted to:
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2 Bathing Beach Road
Nantucket, Massachusetts 02554

Submitted by:
Siasconset Beach Preservation Fund
c/o Jenny Garneau
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Prepared by:
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July 2, 2013

2.0 Alternatives for Road and Bluff Protection

This section provides a summary description of ten alternatives for preventing erosion of the coastal bank at Sconset.

2.1 Geotextile Tubes

Geotextile tubes (geotubes) are fabricated from high strength, woven polyester or polypropylene sewn together into a tube shape and filled with sand. A conceptual geotube design for a 50-year storm would consist of at least four 30-foot-circumference geotextile tubes installed in a terraced alignment and covered with clean sand fill. Construction would require excavating the existing profile to +4.5 feet MLW and installing a 3-foot-circumference anchor tube and scour apron. Geotubes would then be installed and filled on the excavated terraces to approximately 5 feet tall and 11 feet wide. After the geotubes were filled, a clean sand fill would be placed to a top elevation of approximately +23.5 feet MLW. The sand fill would be placed on a 1 vertical: 2.5 horizontal slope to meet existing grade while maintaining a continuous one foot thick sand cover over the filled tubes.

Geotextile tubes are not well-suited to a high energy environment like Sconset. Too much scour at the toe could potentially lead to structural failure (even when a scour apron is included in the design). Geotubes are susceptible to damage from vandalism, debris, and storm waves; storm-driven debris may puncture and tear the tube. For this reason, maintenance costs for geotubes tend to be higher than for other alternatives. When ripped open by storm waves, geotextile tubes may fail in place, emptying sand onto the beach and possibly releasing geotextile material to the coastal environment. The release of sacrificial sand would not have any adverse environmental effects since clean, beach-compatible sand would be used to fill the tubes. However, replacement of the geotube would be expected to be required on a frequent basis (one or more times annually). Such replacement often cannot be accomplished between successive storms, potentially leaving the bank vulnerable to wave-induced scarping at the toe (and subsequent slumping of the upper bank, which undermines vegetative stabilization that otherwise works) at the time when protection is most needed. For these reasons, geotubes are not considered a viable long-term erosion control solution.

2.2 Beach Nourishment

Beach nourishment would involve the placement of approximately 2.6 million cubic yards of sand on Sconset Beach. The nourished beach would be approximately 200 feet wide with a berm height of 12-16 feet above MLW. Sand would be obtained from an offshore borrow site; a likely candidate would be the offshore shoal system known as Bass Rip, though other potential sites could also be evaluated. The wider beach would absorb and dissipate wave energy, thereby increasing protection to infrastructure and property threatened by erosion and storm damage. Additionally, the wider beach would potentially